Gas Journal

VOL. 293. 110th YEAR. LONDON, MARCH 12, 1958 No. 4939 PRICE 1/6

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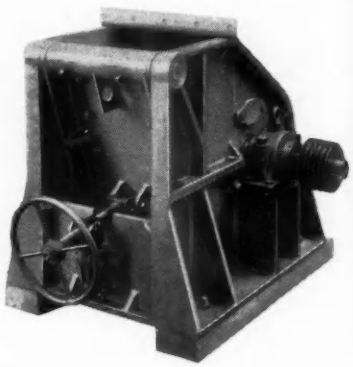

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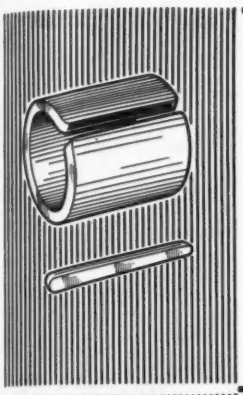

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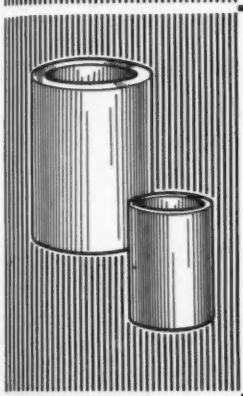

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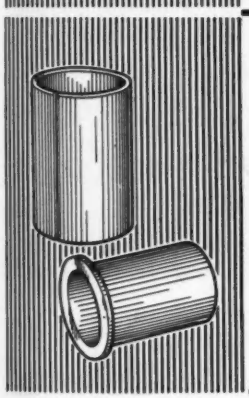

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Gas Journal

VOL. 293 NO. 4939 March 12, 1958

110TH YEAR

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CONTENTS

PETITION 529

CORRESPONDENCE

Not the Thin End of the Wedge? Wm. B. McArthur .. 532

SPECIAL ARTICLES

New Head Station Boosters for Mortlake Works of Australian Gas Light Company. By N. G. Mather 534

Transatlantic Cable. From Hilding Carlson 537

NEWS OF CURRENT EVENTS

Personal 531

Committee Named for Gas and Electricity 531

Obituary 531

Calendar & Directory Alterations 531

Radiation Group Profit Fell by £185,000 in 1957 532

Diary 532

Mining Industry Shows Signs of Entering Slump 533

Lurgi Plant Contractors 533

British Oxygen Chief on Expansion Abroad, Need for Caution at Home. 533

Simon-Carves Ltd. Win New Dollar Order 533

Canada Must Export Natural Gas to U.S., says Westcoast Chief 536

Manx Gas Co., Profits Down 536

Milestone in Indian Steel Development 536

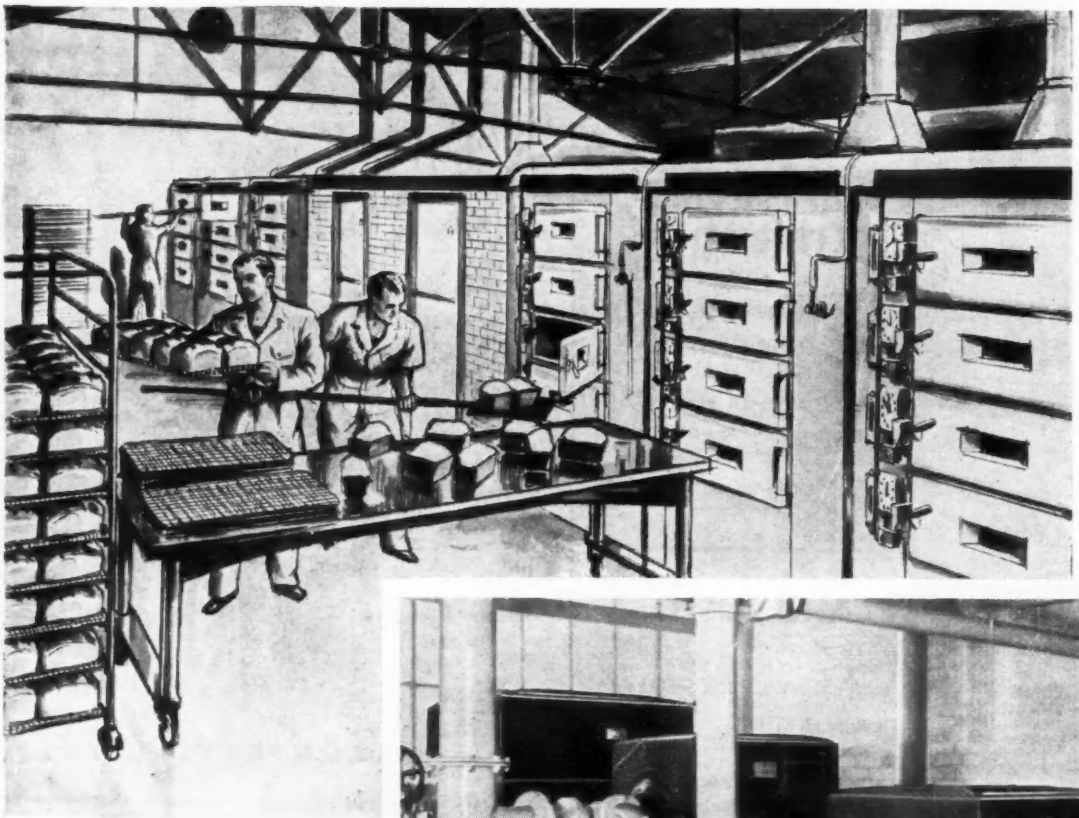
Middle East Trade Council to be Set Up 536

TECHNICAL RECORD

Operating Results at the Swan Village Gasworks. By J. R. Kilvert 543

Some Notes on Gas Governors. By H. E. Shaw 550

PUBLISHERS' NOTICE, SEE PAGE 555



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Gas Journal

VOLUME 293. No. 4939. MARCH 12, 1958. 110th YEAR

PETITION

EARLY this year we, the publishers of the 'GAS JOURNAL' and 'GAS SERVICE,' decided to petition the Chancellor of the Exchequer to remove hire purchase control and purchase tax from gas-fired domestic space heating appliances. It was felt that such action would bring about the following advantages to the consumer and to the nation as a whole.

1. Enable the gas industry to expand its natural space heating load and thereby reduce the price of gas to its consumers.
2. Make a significant contribution towards the more efficient utilisation and conservation of the country's fuel resources.
3. Increase the public demand for such appliances and thus lead to substantial assistance in smoke abatement.
4. By the development of a domestic gas-fired space heating load effect valuable savings in the transport and manpower involved in the delivery of coal.
5. Recreate a home market for gas-fired space heating appliances—which market has virtually collapsed since the discriminatory imposition of these controls—and by so doing provide a dependable foundation on which to build, and compete in, export markets where there is both a good demand and increasing opportunity for the sale of such appliances at competitive prices.
6. Enable these advantages to be attained for a very much lower capital investment, distribution and maintenance cost than would be incurred in promoting the sale of any other fuel for this purpose.

It was considered that the greater demand for gas resulting from the increased sale of these appliances would be properly controlled and directed by the area gas boards.

The importance attached by important and responsible sections of the community to rectifying the harmful anomalies now obtaining are indicated by the remarkable response to this petition. Members of Parliament, Trade Unions, Local Authorities and many organisations and firms connected with, or served by, the gas industry have given their support. A complete list appears overleaf.

The petition, which was delivered to the Chancellor of the Exchequer on March 7, will, we hope, finally convince him of the absurdity of the anomalies existing in connection with heating appliances. That modern gas heaters, which are smokeless, highly efficient, and extremely economical from the national point of view, should carry the crippling burden of a 60% purchase tax, while appliances burning imported oil and raw coal go free, is a situation so ridiculous as to be downright tragic.

Many efforts have been made to persuade the Chancellor to put matters right, but it may be significant that they have all been individual efforts—recommendations and resolutions stemming from specific bodies. The Gas Council has tried repeatedly to get purchase tax removed from these appliances; indeed, the most recent attempt took place only a few weeks ago. Sir Harold Smith has been extremely outspoken and has never let an opportunity slip of bringing this anomaly to the attention of the Press. But so far all efforts have been in vain.

This petition of ours marks the first occasion on which there has been organised collaboration on this matter. Indeed, never in the history of the gas industry has anything been done on this scale and in this way. We hope that where individual effort failed, collective effort will succeed.

We would like to point out that although the published list includes all those organisations who actually signed the petition, there were many others who explained that although in complete agreement with the sentiments we expressed, they nevertheless felt unable to sign for some constitutional reason. A number of Members of Parliament and Local Authorities took this view, and it will be noticed that five of the 12 Gas Consultative Councils abstained. Many people thought our arguments applied equally well to electrical heating appliances and preferred not to differentiate between the two fuels. We do not subscribe to this view, believing that the substantially higher cost of manufacturing a gas fire than an electric fire tends to make the gas industry suffer more than its competitor in this matter; equally

we believe that an enlightened fuel policy would recognise the fact that space heating is a 'natural' load for the gas industry.

Reference has been made to the petition in a number of other journals, and by forming the subject of discussion and speculation the merits of gas and the way in which it is suffering from unfair competition have received wider recognition.

Whether the petition proves to be successful or not, we believe that this is an example of how a technical journal can serve the industry with which it is associated.

SIGNATORIES

Members of Parliament

Hugh Fraser	G. S. Lindgren	John Parker
W. S. Shepherd	W. Hannan	Albert Roberts
Harold Neal	Sir W. Robson-Brown	David Griffiths
J. McInnes	P. L. E. Shurmer	A. E. Hunter
Gerald Nabarro	Francis Noel-Baker	J. B. Hynd
Marcus Lipton	J. Dickson Mabon	

Trade Unions

Transport & General Workers' Union (1,294,666 members).
Association of Supervisory Staffs, Executives and Technicians (20,000 members).
Gas Officers' Guild (1,100 members).
British Gas Staff Association (19,000 members).
National Union of Stove Grate and General Metal Workers (6,000 members).

Manufacturers connected with the Gas Industry

Newton, Chambers & Co., Ltd.	Evered & Co., Ltd.
F. J. Ballard & Co., Ltd.	R. & A. Main Ltd.
Abbott, Birks & Co., Ltd.	Sperryn & Co., Ltd.
E. E. Jeavons & Co., Ltd.	Ashmore, Benson, Pease & Company
The Bryan Donkin Co., Ltd.	The Power-Gas Corporation Ltd.
Robert Dempster & Sons, Ltd.	The Horstmann Gear Co., Ltd.
William Press & Son, Ltd.	General Gas Appliances Ltd.
Dougall's Gas Meters Ltd.	Metropolitan Gas Meters Ltd.
The Diaphragm & General Leather Co., Ltd.	George Waller & Son, Ltd.
Simon-Carves Ltd.	Joseph Morton Ltd.
Keith Blackman Ltd.	Milne (Edinburgh) Ltd.
C. R. Averill Ltd.	W. J. Jenkins & Co., Ltd.
Clayton, Son & Co., Ltd.	Incandescent Heat Co., Ltd.
Williamson, Cliff, Ltd.	Radiant-Heating, Ltd.
George Glover & Co., Ltd.	F. J. Gould (Gas Engineers) Ltd.
Robert Cort & Son, Ltd.	The Forth and Clyde & Sunnyside Iron Cos., Ltd.
Peebles & Co., Ltd.	West's Gas Improvement Co., Ltd.
Crane Ltd.	Humphreys & Glasgow Ltd.
Gardiner & Gulland Ltd.	The Drayton Regulator & Instrument Co., Ltd.
Whessoe Ltd.	The Meltham Silica Fire Brick Co., Ltd.
Thomas Thorp & Co., Ltd.	Alexander Wright & Co., Ltd.
The Derbyshire Silica Firebrick Co., Ltd.	Oxley Engineering Co., Ltd.
S. Cutler & Sons, Ltd.	Bolton Metal Products Ltd.
Henry Slack & Sons, Ltd.	George Orme & Company.
Woodall-Duckham Construction Co., Ltd.	J. & J. Braddock.
The Leeds Fireclay Co., Ltd.	Sawer & Purves
Edward Cockey & Sons, Ltd.	Cannon Industries Ltd. (Chemical Plant Works).
Phœnix Supply Co. (Croydon), Ltd.	Cannon Industries Ltd. (Union Shop Stewards).
Righton & Sons, Ltd.	Thomas De La Rue & Co., Ltd. (Potterton Division).
Bowden Bros. & Company.	E. Pass & Co., Ltd.
Spencer-Bonecourt-Clarkson, Ltd.	W. & H. Wilson Ltd.
	Lambert Brothers (Walsall), Ltd.

Employees represented by the above companies total 41,358.

In addition 34 other companies have signed the petition.

Local Authorities

Urban District Councils

Staines	Withernsea	Benfleet
Tyldesley	Longdendale	Glyncorrwg
Urmston	Billenge & Winstanley	Church Rawmarsh
Clacton	Prestatyn	Caerphilly
Camborne Redruth	Waltham Holy Cross	Cannock
Bingley	Llanrwst	Huyton-with-Roby
Washington	Abercarn	Sheringham
Mynyddislwyn	Abertillery	Yiewsley & West Drayton
Rainford	Usk	Stanley
Wardle	Seaton	Heanor
Wem	Skegness	Aireborough
Portland	Wednesfield	Holyhead
Brynmawr	Wigston	Kearsley
Sleaford	Staveley	Llandeilo
Whitworth	Westbury	
Rishton		

Rural District Councils

Cookham	Atherstone	Isle of Wight
Sedbergh	East Elloe	Winslow
Petworth	Darlington	Pontardawe
Castle Ward	Dickingham	Thornbury
Tamworth	Durham	Lydney
Clitheroe	Derwent	Shipston-on-Stour
St. Asaph	Stone	Rhayader
W. Lancashire	Torrington	Chesterfield
Aled	Ystradgynlais	Easington
Leyburn	Peterborough	Valley

Borough Councils

Morecambe & Heysham	Chorley	Sale
Abingdon	Coventry (County)	Blackburn County Borough Council
Daventry	St. Pancras (Metropolitan)	St. Helens County Borough Council
Middleton	Macclesfield	Northumberland County Council
Pembroke	Mossley Town Council	Rotherham Corporation
Calne	Wigan County Borough Council	Crosby Corporation
Scarborough	Bermondsey	
Accrington	Bootle	
Welshpool		
Honiton		
Harwich		

Other Organisations Supporting the Petition

Northern Gas Consultative Council.	South Western Gas Consultative Council.
North Western Gas Consultative Council.	West Midlands Gas Consultative Council.
North Thames Gas Consultative Council.	North Eastern Gas Consultative Council.
Wales Gas Consultative Council.	The Society of British Gas Industries.

The Standing Conference of Women's Organisations (incorporating Townswomens Guilds, National Council of Women, Y.W.C.A. Auxiliary, Catholic Women's League, College of Nursing, British Red Cross Society, Women Citizens, College of Midwives, Conservative Women's Organisation, Women's Communist Party, Women's Co-operative Guild, Federation of Sisterhoods, W.V.S., Ladies Circle, Toc H., British Federation of University Women, Electrical Association of Women, Family Planning Association).

The Women's Gas Federation. Liverpool Co-operative Society.

The Petition was also signed by many individuals.

Personal Notes

DR. R. A. MARSDEN M.B.E., has received the City and Guilds of London Institute Special Award, 1958, Chemical Industries—Gas Engineering. The citation reads: Dr. Marsden obtained a Full Technological Certificate of the City and Guilds of London Institute in Gas Engineering in 1912, following courses of study at the Technical College, Derby, and subsequently he studied at the University of Bristol. For the past 20 years he has been a Member of Court of that University. He progressively held the appointments of Chief Chemist to the Bath Gas Company, Chief Chemist to the Bristol Gas Company, and was a Lecturer in Inorganic Chemistry and Gas Engineering in the Faculty of Engineering, University of Bristol, and the Merchant Venturers' Technical College at Bristol. He is a Member of the Board of Governors, College of Technology, Bristol. He now holds the appointment of Area Scientist to the South Western Gas Board and has received many awards and distinctions, including his appointment as Jubilee Memorial Lecturer to the Society of Chemical Industry in 1955. He is a past Vice-president of the Society of Chemical Industry and is a recognised authority on the subject of carbonisation of coal.

Mr. Arthur J. B. Morgan, driver of an acid tanker for the Tottenham Division of the Eastern Gas Board, has just retired with a driving record which is believed to be shared by only two other men in the country—the medal of the National Society for the Prevention of Accidents for 37 consecutive years' freedom from accidents on the road. He is pictured above receiving the award from Mr. C. T. Harvey, Tottenham Division Transport Manager.

MR. S. A. J. HORROD, East Midlands Gas Board's Group Manager at Loughborough, Leics., is leaving in April to take up a newly-created post as Works Study Officer for the Board's Leicestershire and Northamptonshire Division. Mr. Horrod, who has had 20 years' experience in the industry, will take a course of training in works study before beginning his new duties; he will then work from the Leicester headquarters. He went to Loughborough in 1950 as Deputy Gas Engineer and District Manager, and he was promoted to his present position five months' later.

MR. R. J. BALLARD has been appointed Sales Manager, Domestic Division, Creators Limited of Sheerwater, Woking, Surrey, in place of MR. D. I. SHAKESPEARE, who has now resigned from the Company.

BRIGADIER D. RUSSELL MORGAN, D.S.O., M.C., has been appointed by the Scottish Gas Board to the post of Civil Defence Officer.

MR. L. F. NICHOLSON has retired from the service of the Colombo Gas & Water Co., Ltd. Mr. Nicholson joined the Company in January, 1937, as Resident Engineer and Manager and was appointed General Manager in August, 1949. Before joining the Company he was with the Hong Kong & China Gas Co., Ltd. MR. T. G. DRAPER, who has been Assistant Engineer and Manager since September, 1945, has been appointed General Manager.

MR. W. O. KIRKWOOD, General Manager of the Sunderland Division of the Northern Gas Board, recently presented a canteen of cutlery to MR. EDWIN MORRELL to mark his retirement after 48 years' service to the industry. Mr. Morrell has been employed since he was 17 on the administrative staff of the former Sunderland Gas Company and since vesting day in the Sunderland unit offices.

MR. B. W. DAWKINS has been elected Chairman of Saxon Engineering Co., Ltd., and Bennis Mechanisations Ltd., both of Fenton, Stoke-on-Trent, and subsidiary companies of Bennis Combustion Ltd., Little Hulton, Walkden, Manchester. Mr. Dawkins is Joint Managing Director of the parent Company, Bennis Combustion Ltd.

Committee Named for Gas and Electricity

SIR CECIL WEIR, who among several public appointments has served as head of the British delegation to the European Coal and Steel Community and as economic adviser to the Control Commission for Germany, will lead the committee appointed by the Minister of Power to re-examine the possibilities of economic co-operation, without affecting the basic competition between, the gas and electricity industries.

Other members will be Mr. R. R. B. Brown, Chairman, Southern Electricity Board; Mr. G. le B. Diamond, Chairman, West Midlands Gas Board; Sir Edward Herbert, East Midlands Gas Board; Sir Henry Jones, Deputy Chairman, Gas Council; Sir John Imrie, South of Scotland Electricity Board; Mr. C. T. Melling, Electricity Council; and Mr. Austin Morley, Managing Director, W. & T. Avery, Ltd. One more member remains to be appointed. The Secretary will be Mr. W. R. G. Bell, Ministry of Power.

The committee's terms of reference are: 'To consider ways in which, by co-operation between the area and Scottish electricity and gas boards . . . the administration of the services of a like kind provided to the public by the two industries might be improved, and to make recommendations.' A report will be made to Parliament.

The committee will not be concerned with the general policy of the two industries nor with competition between them.

Obituary

MR. PERCY DREWETT, who retired from the post of Manager and Secretary of Fareham Gas Company when it was taken over by Portsmouth Gas Co. in 1925, has died aged 79.

MR. ROBERT MACDONALD SIMPSON, formerly Engineer and Manager, Denny gasworks, has died in Edinburgh.

MR. DANIEL SYM MUNN, former Gas Manager, Renfrew gasworks, died recently.

Awards for Bravery

OF ten Midlanders who risked their lives in rescue attempts and who are named in Royal Humane Society awards for bravery, eight—including five employees of the West Midlands Gas Board—won their awards when gas overcame two others in a repair trench in Rabone Lane, Smethwick.

Casualties Union Day

Casualties Union are this year holding their open competition in first-aid and diagnosis on October 5—Casualties Union Day—at the premises of the George Cohen 600 Group, Wood Lane, London, W.12.

Calendar & Directory Alterations

The following changes have been notified recently. To keep the information in the current issue of the 'GAS JOURNAL' Calendar and Directory up to date readers are invited to note these alterations in the Directory Section.

Page D39.—BERKHAMSTED: Delete G. W. Ellis, *Dist. M. & E.*, retired.

Page D50.—NORTH THAMES GAS BOARD: Delete S. Pexton, *Senior Fuel Chemist*, retired.

Page D103.—AREA HOME SERVICE ADVISER, SALES AND SERVICE MANAGER, COKE MANAGER: Address should read 17, Augustus Road, Edgbaston, Birmingham, 15 (telephone unchanged).

Page D111.—SCOTTISH GAS BOARD: Insert H. R. Hart, *Member*.

Page D117.—ARDROSSAN: Insert Ian Simpson, *M*.

CORRESPONDENCE

Not the Thin End of the Wedge?

DEAR SIR,

Your leader 'Thin End of the Wedge,' in the 'GAS JOURNAL' of February 12, purporting, I assume, to represent the gas industry reaction to the Minister of Power's decision to appoint a committee to look at electricity and gas, is a most negative approach.

Publications on the electricity side have shown hostility before even examination begins; facts have been prejudged and in my opinion rash conclusions determined in advance.

Your contributions to the subject stress fear of the outcome of the committee's review and particularly miss the great opportunity of giving a lead. In my opinion you should be counselling the Minister to be bold and call upon his new committee to deal with, first, the major problem—formation of a comprehensive Ministry of Power policy, and, second, review the services within which there may be duplication.

A basic balanced fuel and power policy within the national economy, taking into consideration not only coal, electricity, and gas, but also oil and the foreseeable and measurable nuclear energy, is surely an urgent need.

It is surprising that the gas industry is so silent on what might be termed a prerogative of politics. The Gas Council and boards can surely point the 'correct' direction ('right' or 'left' is not mentioned).

Exciting developments are afoot in recent research and gas has a great deal to contribute to the nation's wellbeing. Do not let the prejudice 'Gas or Electricity' spoil any effort under a co-ordinated policy and thus miss great potential benefits.

Yours faithfully,
WM. B. MCARTHUR.

28, Polwarth Gardens,
Glasgow, W.2.
March 1, 1958.

SO THEY'RE NOT *ALL* ACCIDENTS

DURING a test period of six months last year, it was found that only 15% of the gassing tragedies in Scotland were accidental, said Sir Robert Nimmo, Chairman of the Scottish Gas Consultative Council, in Glasgow recently. The industry, he said, was suffering from over-emphasis being put on gassing accidents, and this had a bad psychological effect on others.

A very large proportion of gassing accidents were the result of suicide attempts, but the reasons were not reported in the Press when the cases were brought to light, he added.

Radiation Group Profit Fell by £185,000 in 1957

But Sales of New Products were up 16% on 1956

FINAL dividend of 5%, less tax, in respect of the year ended December 31, 1957, is recommended by the Directors of Radiation, Ltd. Aggregate profits of the Radiation Group for the year were, gross, £188,898 (against £491,286 in 1956), less tax, £140,632 (£257,713), leaving £48,266 (£233,573).

Trading Restrictions

The Directors state that 'the results for the year were affected by continued trading restrictions which were further increased in September. The intensified development instituted to meet these conditions involved heavy preproduction costs. The new products were not in full production at the close of the year so that the accounts reflect the full cost but not the full result in income.

'In view of the encouraging reception of these latest products, as evidenced by a level of sales showing an increase of 16% compared with the same period last year, the Board recommend the payment of Ordinary dividend by augmentation from the general reserve of Radiation, Ltd., which was set up in earlier years to meet such an exceptional contingency.'

Diary of Forthcoming Events

March 13.—THE INSTITUTE OF FUEL (SOUTH WALES SECTION): B.P. Refinery, Llandarcy. Joint meeting with the Institute of Petroleum including paper on 'Oil Fuel Applications with Special Reference to Wales,' by T. Chippindale.

March 14.—LONDON JUNIORS: Meyerstein Theatre, Westminster Hospital School of Medicine, Horseferry Road, S.W.1. 'Gas in the Atomic Age,' by Dr. J. G. King. 6.30 p.m.

March 14.—JUNIOR INSTITUTION OF ENGINEERS: Pepys House, 14, Rochester Row, Westminster, S.W.1. 'Available Energy,' by R. D. Gifford. 7 p.m.

March 15.—MIDLAND JUNIORS: Station Hotel, Dudley. Annual Dinner. 6.30 p.m.

March 15. — YORKSHIRE JUNIORS: Britannia House, Leeds Road, Bradford. Meeting and film show. 2.30 p.m.

March 18.—I.G.E. (LONDON AND SOUTHERN SECTION): Pepys House, 14, Rochester Row, London, S.W.1. 'Some Methods of Making Gas from Oil,' by Dr. G. Milner and Mr. A. S. Taylor of the Power Gas Corporation, Ltd. 2.40 p.m.

March 19.—THE SOCIETY FOR ANALYTICAL CHEMISTRY (SCOTTISH SECTION): University of Edinburgh. Meeting on 'Developments in Gas Chromatography.' 7.15 p.m.

March 19.—COMBUSTION ENGINEERING ASSOCIATION (NORTHERN REGION): Grand Hotel, Sheffield, 1. Meeting includes Brains Trust on 'Space Heating and Insulation,' and papers on 'Boiler Inefficiency.' 10.30 a.m.

March 19.—EASTERN SECTION, I.G.E.: Thetford. Spring Meeting including an address by Sir John Stephenson, C.B.E., J.P., Chairman of the Eastern Gas Board.

March 19.—THE INSTITUTION OF CHEMICAL ENGINEERS (GRADUATES AND STUDENTS SECTION): University College, Cardiff. 'Gas/Solid Reactions in Fluidised Beds,' by Professor E.S. Sellers. 7.0 p.m.

March 20.—INSTITUTE OF FUEL (EAST MIDLAND SECTION): Loughborough College. 'Small Pressurized Water Atomic Power Plants.' 7.15 p.m.

March 22. — NORTHERN JUNIORS: SUNDERLAND. 'Communications,' by Mr. H. B. Buttall.

March 22.—WESTERN JUNIORS: Joint Meeting with the WALES AND MONMOUTHSHIRE ASSOCIATION: Aberavon Works. Luncheon 1.15 p.m. Visit to the Aberavon gasworks at 3.15 p.m.

March 24.—WEST MIDLANDS G.C.C.: Edmund Street, Birmingham 3. Meeting at 2.30 p.m.

March 24.—WALES & MONMOUTHSHIRE JUNIORS: Holywell. Paper by Mr. F. W. Stobart.

March 25.—MIDLAND JUNIORS: Staff Mess Room, Birmingham. 'The Southern Gas Board in 1957,' by Dr. A. E. Haffner. 6.30 p.m.

March 26.—INSTITUTE OF FUEL (YORKSHIRE SECTION): Royal Victoria Hotel, Sheffield. Annual General Meeting, 2.30 p.m.

New Coke-oven Site

The South Durham Steel and Iron Co. Ltd., who are planning the erection of a coke-oven plant at South Bank-on-Tees (Yorks.) are to prepare a revised scheme re-siting the plant further from residential property. The local authority recently received a petition from 150 people complaining that the new ovens would be too close to their houses.

Clean Air for Glasgow

Glasgow Corporation has under consideration a proposal to establish a smoke-control zone in the centre of the city. The area, of about 200 acres, will be one of the most complex in the country, 4,126 separate premises having been surveyed—414 industrial, 3,449 commercial, 236 domestic, and 27 other premises.

Days of 'coal at any cost' are over, says Lord Mills

Mining Industry shows Signs of Entering Slump

THE cessation of coal imports and impending adjustments to pithead prices were announced last week by the National Coal Board. A few days before the announcement was made, Lord Mills, Minister of Power, speaking in London, said a need had now arisen in the coal industry for selectivity of output, instead of 'coal at any cost.'

Lord Mills declared: 'The price of coal has now got so high that people are thinking before they buy, and looking at the alternative.' The coal industry had now to be a business which was run as a business, and which had to meet public requirements, he added.

Price Changes

While the price of coal for gas-making is to remain unchanged, the N.C.B. urges industrial consumers of the larger sizes of coal to substitute smaller sizes wherever this is practicable. To encourage this, the pithead prices of industrial coals are to be increased from March 17, while the prices of the smaller sizes will be reduced. On balance, the changes will not alter the Board's total revenue.

Also unaffected by the impending changes are the prices of coal for the domestic market, hospitals, schools, etc. Coal for the railways also will remain unchanged; as will supplies for coke-making and the generation of electricity.

A Glut

Although accumulated coal stocks declined a little last week, the impending price adjustments lend fresh support to recent indications that the coal industry may be entering a slump. Output from the mines during the first eight weeks of this year was nearly 1.5 mill. tons less than a year ago, but stocks are now about 6 mill. tons more. For the first time in 17 years there is a glut of coal.

Moreover, while the Coal Board is offering long-term overseas contracts, export figures to date are not encouraging; although a few relatively small orders were received last week.

Absenteeism Leaps

Apparently, as a result of this depression, miners have shown a big increase in absenteeism. Compared with this time last year, absenteeism has risen by more than 2% to 15.13%. On any given working day nearly one miner in six stays away from work—and yet coal production exceeds demand.

In addition to the present surplus of unsold coal, the N.C.B. is now faced with a glut of about 1.5 mill. tons of coke. The Board accordingly, proposes to close down eight of its coke ovens—three in Durham, three in Yorkshire, two in South Wales—a step which would put some 1,000 men out of work.

'DON'T PICK THE BEST SITES'

GAS and electricity boards often site their offices in the best commercial districts of cities and towns, without making an appropriate contribution to the local rates, Mr. R. G. Page complained in the House of Commons recently.

'There are cases,' he said, 'where office sites have been taken and the local authorities receive only a share from a pool—a share which is not commensurate with what would be received if the premises were ordinarily rated.'

Mr. Henry Brooke, Minister of Housing and Local Government, undertook to discuss the point with nationalised industries and local authorities.

RETROGRADE

Huddersfield and District Quarry Owners' Association has sent a letter of protest to Huddersfield Town Council against the proposed use of Portland stone for the new premises to be built by the North Eastern Gas Board in High Street, Huddersfield. The Association describes failure to consider the use of local stone as retrograde.

SIMON-CARVES LTD. WIN NEW DOLLAR ORDER

A contract worth $250,000 has been awarded to Simon-Carves, Ltd., to build for Du Pont S.A. de C.V., in Mexico, a sulphuric acid plant with a capacity of 60 short tons of acid per day. They have undertaken to ship the whole of the equipment from Britain in less than seven months.

The order was obtained in competition with both American and German firms. Payment for the plant will be made in United States dollars.

This will be the second Simon-Carves sulphuric acid plant to be built in Mexico. A plant of 25 tons per day capacity was built about four years ago for Quimica Industrial de Monterrey, S.A.

Bath Gas Death: Is there a Lesson? Coroner asks Jury

BUT THEY DO NOT SEEK MAINS TESTS

GAS leaking from a main fractured by a subsidence caused the death of Mrs. Vera Spite, 42, in her flat, an inquest jury decided at Bath recently. A verdict of accidental death was recorded.

An official of the South Western Gas Board said in evidence that there was no 'routine' system of regular testing of gas mains. The jury added no rider to their verdict, although Mr. J. B. Taylor, the Bath Deputy Coroner, said to the jury: 'You may think there is a general lesson to be learnt that no authority, if it be the Corporation or the Gas Board, can henceforward rely on the outward appearance of the road surface, and you may think that some system of routine testing should be introduced.'

Colonial Gas Holdings

Interim dividends have been declared by Colonial Gas Holdings, Ltd., of 3% on preferred stock and 4% on ordinary stock, payable on April 18.

British Oxygen Chief on Expansion Abroad, Need for Caution at Home

CONSOLIDATED profit of the British Oxygen Co., Ltd., for the year ended September 30, 1957, was £5,964,035, after depreciation of £3,217,463, compared with £5,198,464 in the preceding year. The profit increase relates to a sales advance of 14.7% and to the employment of considerable additional capital during the year, says the Chairman, Mr. J. S. Hutchison, in his statement accompanying the annual report.

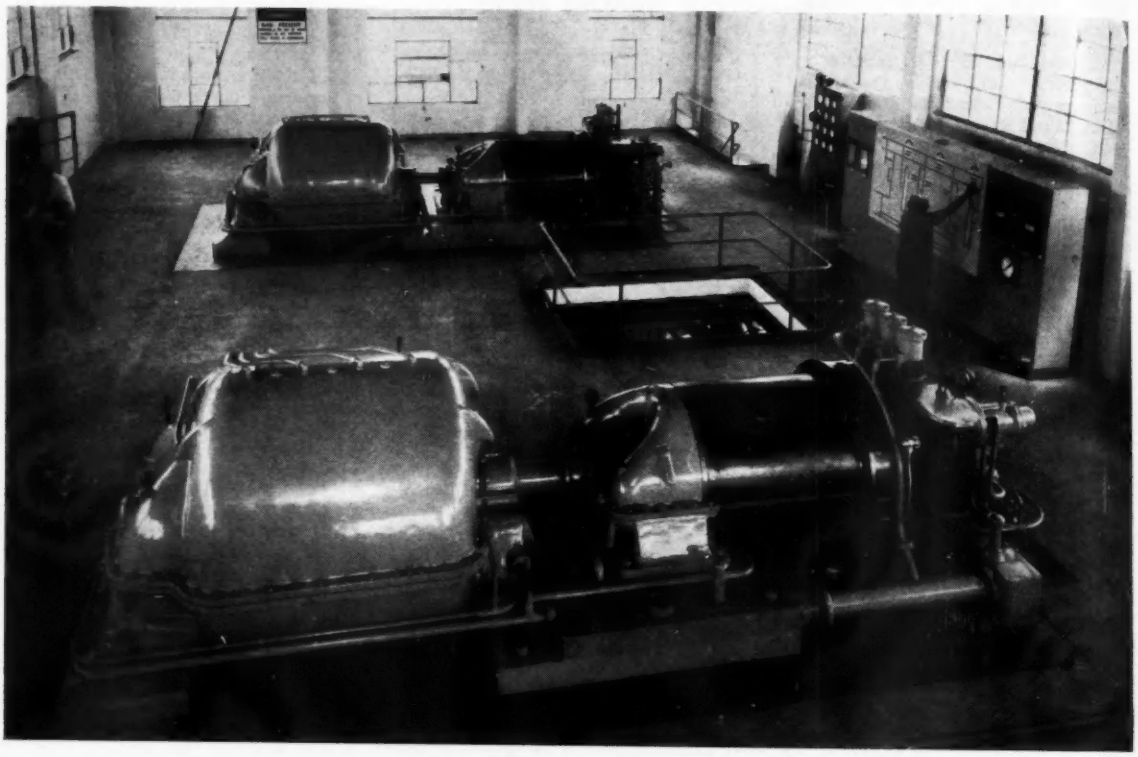
Taxation takes £3,215,099, against £2,699,611, and the net profit available is £2,440,245. Subsidiary companies retain £497,238; general reserve receives £750,000 (against £500,000); Ordinary Stock dividend requires £980,212 (same) and £142,358 is carried forward to make the total of unappropriated profit £1,060,737.

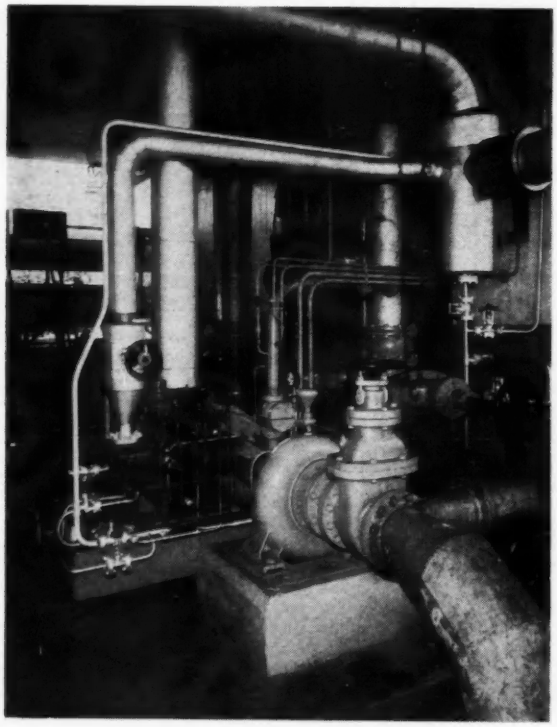
Caution at Home

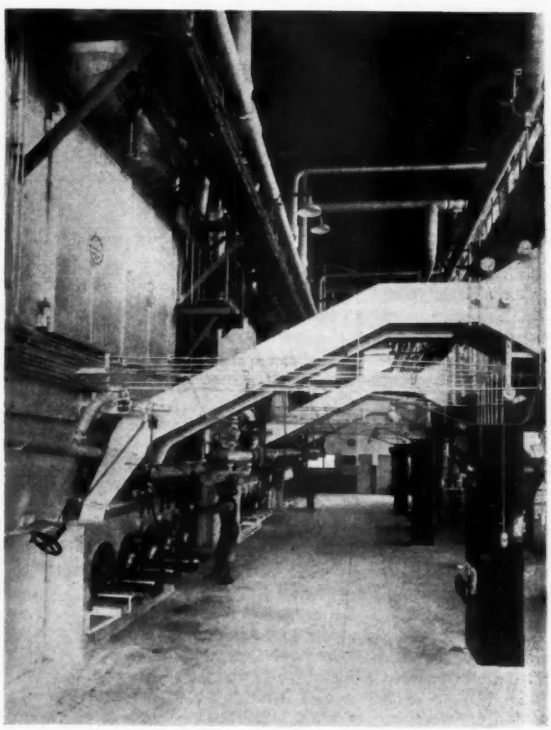
After reviewing the activities of the various divisions of the Company, the Chairman forecasts that industry in many overseas countries will continue to press forward. In the United Kingdom, where the Company responds to the activity of heavy industry and general engineering—a field which today shows many fluctuations—prudence dictates caution and consolidation.

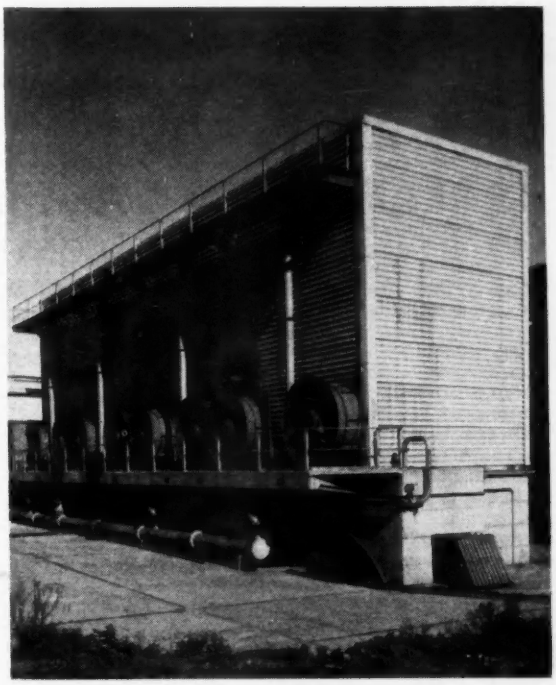
'The width of our activity and the influence of new methods and new construction, particularly in the steel industry, encourage the view that we shall be able to give a good account to you at our next meeting although the months ahead may prove to lack the buoyancy of some recent years.'

New Head Station Boosters for Mortlake Works of Australian Gas Light Company



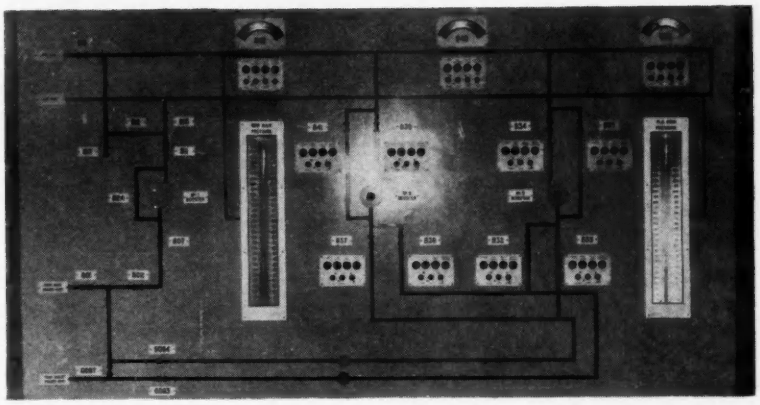






Description and pictures received from N. G. MATHER

Engineer for Design and Construction



THE facilities for distributing gas to the Australian Gas Light Company's area of supply, have just been greatly strengthened by the completion and commissioning of two steam turbine driven gas boosters (pictured at top of left-hand page) at the Mortlake works. An idea of the importance of this installation can be gained from the accompanying map of the Company's distribution system.

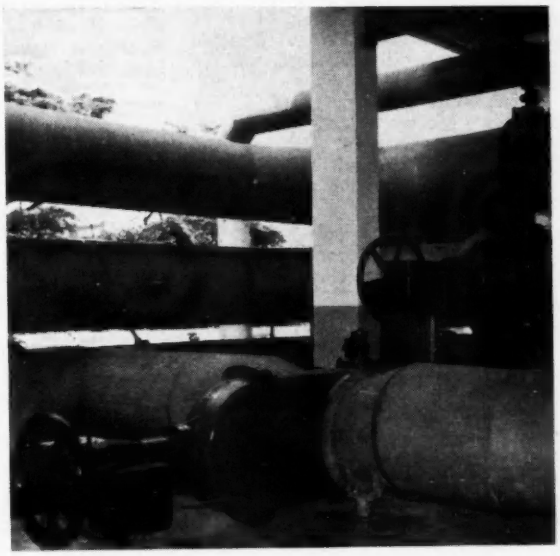
All gas, manufactured or purchased by the Company, must pass through one of these boosters before distribution to customers. Consequently steam turbines were chosen as the prime movers in view of the risk of electrical failure during the severe electric storms of the Summer.

Each booster is capable of delivering 3 mill. cu.ft. of gas per hour at a pressure of 250 in. W.G., and is driven by a steam turbine developing approximately 2,100 horse power. The machines were made by Brown-Boveri, of Switzerland, and the steam condensers by Evans Deakin, of Brisbane. The boosting station is noteworthy for its modern control panel (see centre of this page), which embodies push button operation, indication of all the large gas valves, and recording of gasflows and pressures.

The cooling water for the condensers is circulated by pump driven by auxiliary steam turbines (bottom left, left-hand page) through a battery of six forced draught cooling towers (top right, this page), which were designed by the Company's technical staff. Steam is supplied from a battery of three Babcock & Wilcox boilers (bottom right, left-hand page), each capable of raising 30,000 lb. of steam per hour at a pressure of 150 lb. per sq. in. and a superheat of 100°F. These boilers are fired by liquid pitch.

The 30-in. gas valves which operate in the 36-in. mains are fully mechanised for push button operation from the control panel, and provided with 'Selsyn' operated indicators giving control panel indication of valve position and rate of movement.

Before the installation was put into commission, full load and running acceptance tests were carried out by the contractors, Gibson Battle, of Sydney, in association with A.G.L. technical staff. These tests were satisfactory and the machines were placed on continuous day and night service on February 3.



Canada Must Export Natural Gas to U.S., says Westcoast Chief

'Vast Reserves May go to Waste'

GRAVE concern has been expressed by the Canadian Westcoast Transmission Company at delay in securing export markets for surplus Canadian natural gas. The Company recently told the Royal Commission on Energy, headed by Mr. Henry Borden, that unless available markets were utilised immediately under a national export policy, enormous reserves of gas in Western Canada would be wasted.

Mr. Charles R. Hetherington, Vice-President of Westcoast, said that Canadian gas reserves, in the opinion of the Company, far exceeded the requirements of consumers in Canada, and that markets in the U.S. should be secured for the surplus. Unless reserves were developed soon, other fuels would displace gas and make it as superfluous and as useless as present coal resources in Alberta, he claimed.

Without export possibilities there was no incentive for companies engaged in exploration for oil and gas to continue investing money in development programmes.

Estimated future reserves of gas in British Columbia and Alberta might be as much as 300 bill. cu.ft. compared with present known recoverable pipeline gas totalling 24.5 bill. cu.ft.

LURGI PLANT CONTRACTORS

THE Scottish Gas Board's Lurgi high pressure gasification plant, which, as announced in last week's 'GAS JOURNAL' will be built at Westfield in Fife, will have as its chief contractors Humphreys & Glasgow in association with the Power-Gas Corporation. The undertaking is the result of an agreement between these two companies and the Lurgi Company of Germany. It is presently planned that the plant will be fabricated in the United Kingdom.

Manx Gas Co. Profits Down

SPEAKING at the annual meeting of the Douglas, Isle of Man, Gas Light Co., Mr. W. S. Waid, Chairman, said profit during the past year had been £1,813 lower than in the previous year, but taking into consideration an indifferent season, the result was satisfactory.

Revenue from the sale of gas, residual products, etc., was £175,246, or £7,545 less. Profit on sales of appliances was slightly down, but actual sales were higher than in the previous year. The cost of manufacture of gas was down by £2,254, due mainly to having carbonised less coal.

An interim dividend of 7d. per share was paid last September, absorbing £4,165. The Directors recommend a final dividend of 9.8d. per share, requiring £5,831, leaving a balance of £8,854 to be carried forward to next year's account.

Middle East Trade Council to be set up

ARRANGEMENTS are to be made to keep the Government in touch with representatives of industry and commerce who have practical experience of selling in the Middle East, the President of the Board of Trade, Sir David Eccles, announced in the Commons recently. An Advisory Council on Middle East Trade will be set up. The Minister of State will be Chairman and Mr. W. H. McFadzean, of British Insulated Callender's Cables Ltd., Vice-Chairman and industrial leader of the Council.

May be Expanded

Other business men who are to serve are Mr. R. A. P. Bevan, O.B.E., of S. H. Benson Ltd.; Mr. W. R. Beswick, of the Power-Gas Corporation Ltd.; the Hon. M. R. Bridgeman, O.B.E., British Petroleum Co., Ltd.; Mr. G. C. R. Eley, C.B.E., British Bank of the Middle East; Sir Norman Kipping, J.P., of the Federation of British Industries; Mr. H. G. Nelson, of the English Electric Co., Ltd.; Mr. T. A. L. Paton, of Sir Alexander Gibb & Partners; Sir Henry Spurrier, of Leyland Motors, Ltd.; and Mr. Frank Taylor, of the Taylor Woodrow Group.

Additional members may be appointed from time to time. The Council will also include senior representatives from the Treasury, the Foreign Office, the Board of Trade, and the Export Credits Guarantee Department.

Boy Beats Eight Girls at Cooking

AT the Bradford Group round of the 'Youth in the Kitchen' national competition sponsored by the Gas Council and held at the North-Eastern Gas Board showrooms in Bradford, recently, the winner of the cooking competition was 14-year-old John O'Dwyer, of Hothfield Street, Silsden, whose bacon and egg pie was judged to be better than those baked by eight girls aged from 11 to 19. Miss K. Varley, domestic science organiser for Bradford, was the judge.

John, who is a pupil of Silsden Secondary Modern School, has won previous baking contests at Keighley. His present success brings him a week-end case and a place in the area finals at Leeds on April 2.

The national champion was a boy when the Gas Council ran a similar competition in 1954.

New Shipley Showroom

Councillor S. Rodway, Chairman of Shipley Council, recently opened the new gas showrooms and offices of the North Eastern Gas Board in the new central area of Shipley. Domestic, commercial, and industrial heating appliances are displayed. Dr. R. S. Edwards, Chairman of the North Eastern Gas Board, introduced Councillor Rodway.

Wales G.C.C. 'Insulted'

Members of the Wales Gas Consultative Council said, at a recent meeting in Cardiff, that they had been insulted by the Wales Gas Board at the time of the inauguration of the North Wales grid system by the Duke of Edinburgh last November. No members of the Council were invited it was alleged.

Milestone in Indian Steel Development

British firm completes first half of £3 mill. contract

TOWARDS the end of 1954, a contract for two large blast furnaces, amounting in value to nearly £3 mill. was placed with Ashmore, Benson, Pease & Co. of Stockton-on-Tees, by the Indian Iron & Steel Co., Ltd.

The first of the two furnaces went into operation last month, more than two months ahead of schedule. This furnace, the largest so far in operation in India, has a rated capacity of 1,200 tons of iron a day.

Output to be Doubled

The blowing-in ceremony, at Burnpur, was performed by the World Bank Vice-President, Mr. Burke Knapp, who described the event as, 'a milestone in the development of steel industry in India.' The project is part of the Indian Iron & Steel Company's expansion programme, by which the present output of the company will be doubled to meet India's present Five-Year Plan.

The second blast furnace is planned to go into operation this autumn. The consulting engineers, who planned and supervised this major extension to the Burnpur works, are the International Construction Co., of London.

: TRANSATLANTIC CABLE :: TRANSATLANTIC CABLE :: TRANSATLANTIC CABLE :

COLD WEATHER BEATS GAS DISTRIBUTION CAPACITIES

: FROM HILDING CARLSON :

LOCAL gas shortages were featured in big black type by newspapers throughout the U.S., last month. That is not good. Maximum days for this heating season, probably, were established in practically every undertaking—and some of those would be all-time maximum days.

In the past, as sendout peaks developed, the undertakings have been able to save their systems by cutting off their interruptible customers. If adequate gas was not available (or economically desirable) from the pipeline systems to which they are connected, they were able to manufacture enough gas in standby plants to get their distribution systems through relatively short periods of intense cold.

Last month, the total effort proved inadequate for a number of the undertakings. They 'lost' their systems. That is a dreaded situation: Not enough gas in the distribution piping to maintain pressure and supply to customers. Gas men the world-over know that only trouble follows that operational fact. No matter how soon gas becomes available again after a system has been 'lost,' it is a job for trained personnel to relight all connected equipment in the premises of every customer. It is not a do-it-yourself job, is it? That is what went on here last month.

One immediate result has been that 'persons' in Washington are saying that the gas industry does not have enough plant. Within the industry, there are those who quickly comment that 'no criticism of the industry is implied.' In fact, they say, 'there has been much favourable comment on how well the industry met its test.' They might have added, 'with the plant it has.'

Gas representatives have observed to the Federal Power Commission that no company can build a gas system to supply all customers on a maximum day. The word *all* is the kicker. If they mean *all-all*, there is no disagreement, of course. But, *all-all* customers are not the consideration.

Close observers of this industry have forecast this situation for years. Those observers, in the main, have not been top-executives of the undertakings, but they know distribution engineering and economics! What is the cause of the situations that were blazoned on so many pages one last month?

The American gas undertakings have, invariably, oversold their true system capacities. They know the temperature ranges in their service areas. They know, damnear to the cubic foot, what demand will be the result of what degree Fahrenheit. They know how much of that demand is firmly committed gas for homes, hospitals and other essential firm service. And they know how much of it is interruptible. The tariff schedules are arranged accordingly.

Every undertaking that 'lost' its distribution system last month, or that failed to give full service to its firm-service customers can be charged with having failed in its responsibility to those customers. And that service responsibility is a matter of franchise granted by local or state governments.

They gambled that they could meet demand as they sold and sold more gas. Actually, they were gambling that there would not be a protracted period of cold. They lost that wager!

What is the answer? More standby gas-making capacity; more underground storage . . . and a volumetric balance of firm sales commitments and capability. Happily, it can be reported that some (not many!) of the undertakings are acting upon that view.

Total sales of gas by the undertakings and the pipelines to the ultimate consumers have just been tabulated in thousands of therms by American Gas Association's bureau of statistics for 1957 and compared with 1956:

	1957	1956	% change
Total, all gas combined	75,892,000	72,845,600	+4.2
Natural gas	73,602,000	69,804,200	+5.4
Manufactured gas	200,400	331,500	−39.5
Mixed gas (Manufactured and natural)	2,089,800	2,709,900	−22.9
Total, manufactured and mixed	2,290,200	3,041,400	−24.7

The gas industry is the nation's fifth largest, according to tabulations of data by U.S. Internal Revenue Service. That ranking is based upon net capital investment. Preceding the gas industry are electric light and power, railroads, petroleum and telephone—in that order.

There will always be a sloganeer! American Gas Association's 1958 annual convention, its 40th, in October, has chosen 'Gas Builds *A* Greater *A*merica.' Notice the italics? No comments!

Please do not believe that gas lights have disappeared from the American scene. In Philadelphia, 7,513 street lights were due to be replaced by electricity this year. But, all that has been changed. The gas burners cost approximately £19 6s. a year for operation and maintenance. Most of that is labour cost, for the men who wind the spring clock mechanisms that turn the lamps on and off. The city has decided to stop the clock-winding and *let the lamps burn all day.*

Certainly, the economics of that move were a long time in coming to light. That decision saves £14 5s. 8½d. per lamp, per year and doubles the gas cost to £5. The total for burning all those lights, all the time, has been averaged to £7 12s. The comparable electric cost would have been £10 5s. So the city's street lighting engineer calculates the gross saving for a year will be £46,428 11s.

One of the oldsters in the industry, Washington Gas Light Company, is celebrating its 110th birthday. Originally, the company was chartered by the Congress of the United States which is the jurisdictional body for the District of Columbia. The tariff for gas in its earliest days was £2 17s. 1½d. The company employs 2,200 people and serves 365,000 meters. Since 1886, it has paid a dividend on its securities every year.

Some impression of upward trend in natural gas costs here will be obtained from the statement by Federal Power Commission that it had received 6,461 tariff increase filings from gas producers in a 3½-year period. The significance of the period stems from a decision by the U.S. Supreme Court, June 7, 1954, placing the producers' gas tariffs under FPC jurisdiction.

Annually, those tariff increases would amount to £34,339,642. During the period, FPC suspended 1,144 increases amounting to £21,746,712, and allowed 5,317 increases totalling £12,589,334. Of the suspended tariff total, the Commission disallowed £2,505,390. The 1,040 filings that were still under suspension at January 1, aggregate £17,888,319.

Scholarships enabling chemical and mechanical engineering students to prepare for careers in the gas undertaking industry are available at Illinois Institute of Technology. Nine scholarships provide full tuition for four years and will be awarded in May.

California, as reported in these columns from time to time, seems to have an insatiable capacity for gas. Comes now a newly-formed Trans-Western Pipeline Company (from Texas, of course!) aimed at the California market. It was no coincidence that the President of Pacific Lighting Corporation announced last month that his system has signed a contract with Trans-Western for 350 mill. cu.ft. per day for 20 years.

Exploration for oil and gas in the offshore areas of the Gulf of Mexico have

justified considerable equipment development. A new drilling platform has been reported for operation over water that is 600 ft. deep. Most present rigs are limited to water depths of approximately 100 ft.

Brooklyn Union Gas Company, with more than a million connected meters, analysed its low-temperature operations last month and found that, with a 24-hour average of 7°F., its sendout of gas had been 266,188,000 cu.ft. That became its all-time peak and exceeded the previous peak by more than 10%.

Gas available to the undertaking from pipelines was not adequate, so it made 11,900,000 cu.ft. of oil gas and bought 2,600,000 cu.ft. of refinery gas during that day.

Between 5 and 6 p.m. that day a new all-time hourly peak was set with a total of 13,932,000 cu.ft. sent out.

The new business department of this undertaking is one of the few that actually sells gas appliances and house-heating equipment directly to customers. Most American undertakings 'merchandise' appliances and equipment but leave the actual sales to retail establishments. Last year, Brooklyn Union sold appliances to a total of £3,364,534, which included a gain of £921,427 over the 1956 total.

Also, the undertaking's salesmen added 16,871 househeating installations last year. The potential must be tapering-off. The quota in this category for 1958 is 16,955 new installations.

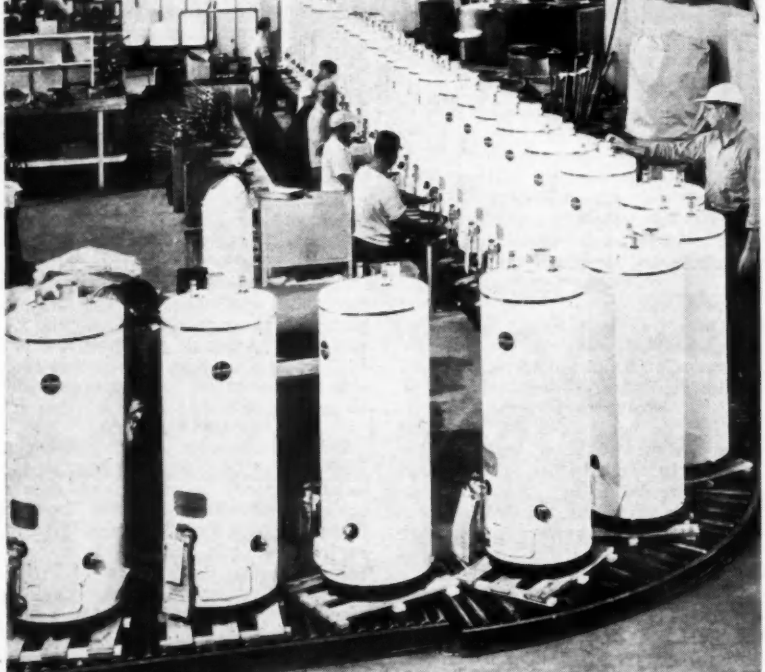
(American sales quotas usually make much higher reaches beyond earlier attainment—just to keep the sales crew from any peace-of-mind. Of course, you understand, quotas are terribly scientific, arrived at by statisticians, economists, market specialists—and then finally determined as some arbitrary but high figure picked by the vice-president-in-charge-of-more-and-more-orders.)

More than 2,544,000 gas-fired automatic storage water heaters came off American production lines last year. That was 7.9% short of the 1956 total, but it included something of a margin over the 800,000 units produced with electric resistance heaters.

There is a trend toward greater-capacity water heaters. Last year, for instance, the percentage decline reported above was accounted for in large part by units with less than 40-gal. capacity. Further, the educated guess by Mr. Edward R. Martin, Director, marketing and statistics, Gas Appliance Manufacturers' Association, is that 1958 sales will show an overall increase of 1.2% for all automatic gas water heaters. That, he says, will break down to a decrease of 2.5% for units of less than 40 gal., and an 11.2% increase for those with capacities greater than 40 gal.

That trend in water heater size has followed the successive introductions of more appliances that require hot water and the recommendations for hotter water—180°F. for automatic dishwashers, is one example.

The accompanying photograph shows completed water heaters coming down the line at one of the plants of A. O. Smith Corporation, for final inspection, boxing and shipment.



Water heaters on the assembly line of A. O. Smith Corporation

The national total for advertising in 1957 is in. Costs to all types of companies using all media aggregated £3,714.3 mill., according to McCann-Erickson Co. That includes an increase of 5.3%, or £189.3 mill. over 1956. Newspapers continue as the most-used medium, but the gain was only 2.8%. Magazine advertising went up 4.4%. The broadcasting media had the biggest increases: Radio, 14.3%, and television, 8.7%.

Canadian Production of Gas Up More Than 20% Last Year

'THE remarkable surge of Canadian expansion which began in 1955 lost most of its upward momentum in 1957,' The Bank of Nova Scotia comments. 'In the course of the year, the total volume of production and employment gradually levelled off and then gave way a little as weakening tendencies spread. The actual level of business, of course, remained very high. The value of the gross national product for the year appears to have come fairly close to $31 billions, roughly 3% more than in 1956. Capital investment expenditures continued to absorb an exceptionally large part of this production and to entail a heavy current-account deficit in Canada's international transactions.'

The bank compared industrial production in Canada, United States and Britain in a chart based on the index for 1953 equalling 100. At year-end, the curve for 'United Kingdom' was dipping downward at 113, 'Canada' was similarly downward at 112 and 'United States' as off to 104.

'The two minerals continuing very strong in 1957,' the bank emphasised, 'were natural gas and uranium. Aided by the construction of pipeline outlets both west and east, output of natural gas rose more than 20% above the previous year.'

Additional exports of Canadian gas to the U.S. will not be licensed before 1960, it may be concluded from the comments of the Chairman of the Royal Commission that is investigating all aspects of Canadian energy resources. The Prime Minister virtually requested that the Commission's report be delayed for two years.

In the meanwhile, however, Westcoast Transmission Company, Ltd., is presenting data to the Alberta Oil and Gas Conservation Board in support of its application to purchase Alberta gas and deliver it at the British Columbia-Idaho border.

Also, there is opinion that all proposed pipelines in current applications before the Board may be engineered to have three times the capacity that is indicated in those applications.

From a paper presented to the Midland Junior Gas Association, December 17, 1957.

Operating Results at the New Swan Village Gasworks

By J. R. KILVERT, Assoc.Fuel (Sheff.), M.Inst.Gas E.,
ASSISTANT ENGINEER, SWAN VILLAGE NEW WORKS,
WEST MIDLANDS GAS BOARD.

THE new Swan Village gasworks has carbonising plant comprising 64 82-in. lambent heated Woodall-Duckham continuous vertical retorts, constructed with a continuous vertical taper. These are arranged as four independent benches, each consisting of 16 retorts. Gas-making was commenced in two benches on March 31, 1953, while the other two benches were gas-making from September 1 of the same year. Numerous novel features were incorporated in the design of this works, erected on a virgin site, and described in a paper[1] presented to the Institution of Gas Engineers in May, 1953, by Mr. S. K. Hawthorn, Birmingham Divisional Engineer. The works has a daily capacity of 11 mill. cu.ft. on a site of 11 acres. This paper is to give details of results obtained and observations based on experience in operating various sections of the plant.

During the 4½ years covered by this paper, a wide variety of coals has been carbonised without trouble. Owing to the fact that the works is situated on the Western Region railway line it was the best sited of the Birmingham works to receive American coal off-loaded at South Wales ports, and from late 1954 until April of this year large quantities of this coal, often in excess of 50% of the total carbonised on a weekly basis, were received. Because of shipping delays, etc., supplies of seaborne coal were very erratic and at short notice substitutions were necessary to make good deficiencies in American coal supplies. It is interesting to note that during the September quarter, 1956, no fewer than 71 different types of coal with swelling numbers ranging from 2 to 8 were received. Besides the imported American coal, Canadian large coal and Ruhr gas nuts have also been carbonised.

In his paper to the Institution of Gas Engineers, Mr. S. K. Hawthorn[1] indicated that it was intended to operate the new Swan Village retort house at high throughputs and high calorific value, and use the water gas plant to produce blue water gas with little oil enrichment as a diluent. (Graphs included in the paper show that this has in fact been carried out.)

Complete Monolith Renewal

Manufacturing statistics, drawn up on an annual basis since the inception of the plant, showed that the coal carbonised during the year ended March 31, 1957, had decreased on the previous two years. This was due to the fact that repairs to retort brickwork were carried out, and from October, 1956, each bench in turn has been cooled down for minor repairs. By repairing at an early stage (after approximately 1,360 days at work during which an average of 10,000 tons of coal per retort was carbonised), it is anticipated that major repairs, *i.e.*, complete monolith renewal, will not be necessary for at least another two years.

The figures for coke used for firing retorts are worthy of note. All producer fuel is received in rail trucks which are weighed before and after tipping, hence accurate weights are available. The producer fuel has averaged 2.37 cwt. per ton of coal carbonised (11.9%) for an average coal gas c.v. of 473 B.Th.U. per cu.ft. This is appreciably lower than the manufacturers' guaranteed figures of 12% at high throughput (500 B.Th.U. per cu.ft. coal gas) or 15.8% at lower throughput (450 B.Th.U. per cu.ft. coal gas).

Details are given of the prime cost of manufacture for coal gas at new Swan Village works together with the annual cost into holder for blue water gas and combined gas, *i.e.*, coal gas plus blue water gas, for each complete financial year since the inception of the works. Itemised costs are expressed as pence per 'decatherm,' one 'decatherm' being equivalent to ten therms. For comparison, the annual cost into holder of coal gas and combined gas (coal gas plus carburetted water gas) for the whole of the Birmingham Division (including new Swan Village works) is included. The net revenue is expressed as a percentage of the cost of coal, while the cost of coal per ton is also shown.

Hypothetical

A study of these costs shows that in spite of the cost of coal at new Swan Village works being from 1s. 1d. to 4s. 7d. per ton above the Divisional average, the prime cost of coal gas into holder was from 0.17d. to 1.25d. per therm lower. It can also be shown that had the coal cost at new Swan Village been equal to the Divisional average, the cost into holder for coal gas would have been from 1.86d. to 1.66d. per therm below the Divisional average. It is appreciated that this calculation is largely hypothetical since the types of coal carbonised vary between works, and, clearly, have differing thermal yields, but in general, owing to the location of Swan Village, rail charges are higher than for the other Birmingham works which have direct access to the Midland Region line. Figures for the prime cost of manufacture of coal gas for the six months ended September 30, 1957, show that with coal at the same price, the prime cost of coal gas is 16d. per 'decatherm' cheaper at new Swan Village, the cost of coke for firing retorts contributing 10.2d. per 'decatherm' (63.75%) of this while labour for carbonising and coal handling contributes 11.25%.

From typical results obtained during four weekly periods working at high and low coal throughputs in 1956 and 1957, respectively (though one bench was shut down for repairs during August, 1957, and the totals shown for low throughput working had been adjusted to four bench conditions for comparative purposes) the gas yield expressed as therms per retort per day is 28% greater at the higher throughput. It would, therefore, appear that the 11.5% increase in thermal output claimed by Mr. Hawthorn[1] was modest. These figures also show that not only is there an increase in thermal output, but the volume of gas produced increased with increased throughput.

In I.G.E. Communication No. 424[1] it was suggested that a combination of continuous vertical retorts with water gas gives wider flexibility in operation both in respect to gas output and coke available for sale than continuous vertical retorts alone. The examples clearly indicate the flexibility of the plant. With throughputs some 5% below nominal, 8.2 mill. cu.ft. of gas of 450 B.Th.U. per cu.ft. are produced, while under high throughput conditions, the 9.6 mill. cu.ft. of coal gas of 493 B.Th.U. per cu.ft. can be mixed with 2.8 mill. cu.ft. of blue water gas (295 B.Th.U. per cu.ft.) to give a total mixed gas output of 12.4 mill. cu.ft. at 450 B.Th.U. per cu.ft. The coke required in the production of this blue water gas (based on 36 lb. per 1,000 cu.ft.) is 45 tons per day bringing the coke and breeze available for sale to 280 tons per day.

Should it become necessary to reduce coke make, *e.g.*, if the price of coke falls in relation to coal or should coke stocks at any time become excessive, the same total volume of gas could be obtained by reducing coal throughput and making 8.2 mill. cu.ft. of gas of 450 B.Th.U. per cu.ft. and adding 4.2 mill. cu.ft. of 450 B.Th.U. per cu.ft., carburetted water

gas. The coke required for production of this carburetted water gas would be 64 tons (based on 34 lb. per 1,000 cu.ft.) Under these circumstances, the coke and breeze available for sale would fall to 168 tons per day.

The fuel gas for heating the settings is generated in 8 ft. diameter mechanical producers of the Humphreys & Glasgow design. Five producers are installed of which four, one per working bench, are normally at work. The average weight of fuel is about 15 tons per producer per day, equivalent to a gasification rate of 28 lb. of coke per sq. ft. per hour. During periods on high throughput, considerably higher rates have been reached, 20 tons per producer per day, equivalent to 37 lb. of coke per sq. ft. per hour being quite common. In a series of tests using No. 4 coke, 25 tons per producer per day (46½ lb. of coke per sq. ft. per hour) was gasified for a few days, but ultimately this rate had to be abandoned owing to the inability of the grate to deal with the ash.

In the early days, considerable trouble was experienced due to failure of the charger cones and seatings resulting in serious leakage of gas during charging operations. It would appear that the ash level limits originally set were too high. Ash tends to build up below Nos. 4, 5 and 6 poke holes which are immediately behind the plough, and, if this build-up is not arrested, can result in rat-holing and channelling of the air with consequent hot spots which lead to high top temperatures in the producer thereby causing overheating of the charger cones, etc. Furthermore, high ash zones severely limit heat transfer to the annular boiler, and hence limit the steam produced. This can affect the blast saturation temperature if sufficient steam is not available from external sources to make up the deficiency from the annular boilers.

Following consultation with the manufacturers, lower ash limits were fixed. To minimise the possibility of overheating the grate in the event of over-extraction in the producer, the ash pan was deepened to enable an extra 6 in. of water seal to be carried. In effect, this meant that practically the whole of the outer seal ring, which is suspended from the base of the annular boiler, was immersed in water. Since making these modifications there has been considerable improvement in the life of cones and seatings and no evidence of overheating of the grate has been noted.

After 4½ years' operation the leading edges of the grate drum ring, which is roughly triangular in shape, are showing signs of wear and will shortly have to be renewed. This is also true of the lower two grate rings. No repairs, apart from slight pointing, have been necessary on the brickwork lining above the annular boiler. A sand-sealed valve is provided on each producer on the outlet of the cyclone. This is used to isolate the producer during temporary shut downs—*e.g.*, while cleaning ashes from the underside of the grate. These valves of cast iron construction are now showing signs of heavy corrosion, a thick scale consisting chiefly of iron oxide and iron sulphide, the latter predominating, forming on the valve. In one instance, the deposit was such that it prevented effective operation of the valve.

Less Heat

As indicated earlier, each producer is equipped with its own annular boiler which generates steam at 20 lb. per sq. in. Under normal operating conditions, the amount of steam generated is more than necessary to give the required blast saturation temperature and the excess passes into the retort house L.P. steam system. Should the depth of ash in the fire-bed rise, less heat is transferred to the boiler since the fire zone may then extend high up the brickwork lining above the boiler, and a shortage of steam may result. In this case, steam is drawn from the retort house L.P. system to maintain the blast saturation temperature.

The gas from the generator passes to a cyclone where the larger sized dust particles are removed. The gas leaves the cyclone at a temperature of 450-550°C. and passes to the producer gas bus main. Originally this dust was collected in closed bogies and disposed of by connecting the loaded bogies to the Drummond dust extraction system. This effectively overcame the dust nuisance which would have been caused had the dry dust been tipped on the general works rubbish heap, or even tipped with the producer ashes. Some two years ago we were approached by a firm of ceramic manufacturers who were anxious to obtain supplies of dry coke dust of relatively small particle size. The producer cyclone dust fully met their requirements, and, although the price offered was only nominal, their offer was accepted as they were prepared to supply containers and provide transport. The amount of cyclone dust recovered is in the order of 0.5% of the fuel (¼ in. to ¾ in.) charged to the producers, equivalent to 672 lb. per day based on 60 tons of producer fuel per day. Tests on this dust show it to contain about 12% of ash. Hence if this dust had not been recovered in the cyclones but had passed forward into the flues and subsequently burned, an additional ¾ cwt. of dust would have been deposited in the flues each day.

Flexibility

In the design of the plant provision was made to admit producer gas as diluent into the retort house foul gas mains. The gas can be drawn from each end of the producer gas main through a seal pot and washer followed by an orifice meter. This system has proved exceedingly useful as during periods when extra gas has been called for, over 1 mill. cu.ft. of producer gas per day has been passed into the coal gas mains. This has been achieved without change in size of fuel to producers or of number of producers at work, and with no increase in labour. This flexibility for meeting exceptional peak loads is extremely advantageous, particularly as the only capital expenditure incurred was the provision of small producer gas washers and inferential meters. To compensate for the lowering of the calorific value when adding this producer gas, additional oil is used on the carburetted water gas machines.

The producers have been rated to gasify 18 tons of No. 4 coke (⅛ in. to ¾ in.) per producer per day. The full amount of this sized fuel was not always available at Swan Village, even taking No. 4 coke from the old works' screening plant, so that the fuel requirements of the producers were made up by either using No. 3 coke or importing No. 4 from other works. To minimise the amount of No. 4 coke imported, the ¾ in. square meshes on the coke screening plant were replaced by ¼ in. square meshes. The resultant coke, *i.e.*, ¼ in. to ¾ in., which has been in use for over 12 months, has been gasified without difficulty at rates as high as 40 lb. per sq. ft. per hour. The change in screen size has meant that we are virtually self-supporting in No. 4 coke now (with elimination of transport charges on coke formerly imported) and that the amount of breeze made has been reduced from 1.8 cwt. per ton coal carbonised to 1.6 cwt. per ton coal carbonised.

A recent analysis of this coke gave an ash content of 13.7% (as received) and a moisture of 12.5%. A producer test, gasifying the above fuel at 33.4 lb. per sq. ft. per hour, showed a production of wet ashes amounting to 21% of the fuel charged containing 11.6% combustibles and 21.6% moisture.

Analysis of the producer gas was, CO_2 6.3%, H_2 13.0%, CO 26.3%, CH_4 0.4%, N_2 54.0% and a calculated c.v. of 129 B.Th.U. per cu.ft.

The costs of producer gas for the last three years show a variation from 6.86s. per ton of coke charged (excluding capital charges) in 1955 to 8.57s. in 1956 and 8.20s. in 1957.

The cost of the coke, therefore, amounts to 86% of the total cost, and in the case of step grate producers with lower maintenance charges, the percentage is probably higher. It is, therefore, obvious that the producer gasifying the cheapest coke will give the cheapest therm of gas, and it is because the mechanical producers at the new Swan Village works can successfully gasify a grade of coke of such low market value that, notwithstanding the higher cost of coal, the prime cost into holder of coal gas at Swan Village is so much cheaper than the Birmingham Divisional average. In this connection it is interesting to note that the average cost of producer fuel at new Swan Village for the six months ended September 30, 1957, was valued at 54s. 7d. per ton, while that at other works in the Division varied from 109s. to 128s. 4d. per ton.

The cost of maintenance on the mechanical producers up to the present time is about £6,000 and amounts to slightly under 18d. per ton of fuel gasified. The maintenance figure can be offset if consideration is given to the question of fuel wasted in the ashes from mechanical and step grate installations, as the following example shows:—

In considering producer gas practice at Liverpool Hubbard

gives these figures for three step grate producer installations on continuous vertical retorts:—

Works	1	2	3	Av.
Dry ashes % dry coke	14.6	12.4	11.4	12.8
Combustible matter is ashes %	37.5	22.2	32.7	30.8

Using the average figures, the combustible matter in the ashes amounts to $\frac{30.8 \times 12.8}{100}$ or 4% of the dry coke to producer.

Allowing 13% moisture in fuel to producers, the combustible matter in the ashes amounts to 3.5% of producer fuel as charged. The figures given for the Swan Village mechanical producers are of the same order as those given by Hubbard[4] for mechanical producers gasifying vertical pea coke.

Dry ashes equivalent to 16.5% of fuel charged and containing 11.6% combustibles, represent the combustible matter in ashes as $\frac{11.6 \times 16.5}{100}$ or 1.9% of fuel charged, *i.e.*, (3.5%-1.9% or 1.6% less than for step grate producers.

When based on the average price of No. 4 coke (55s. per ton) this saving in fuel amounts to 10.5d. per ton while if based on an average price of run of retort coke of 105s. per ton (and I suggest that run of retort coke would be the most probable fuel to be used in step grate producers) the saving would amount to no less than 20d. per ton of fuel gasified.

The argument may be raised that there are installations of step grate producers which are reputed to be successfully gasifying No. 4 coke, and hence are utilising low priced fuel without incurring the heavy capital charges of the mechanical type, but whether the so called 'No. 4' is always ⅜ in. to ¾ in. is probably open to question. I venture to suggest that in these days, when method study is being introduced into retort house operating technique to evolve better and possibly easier ways of doing jobs, when considering rebuilding medium and large size installations any scheme not incorporating mechanical producers (provided that an ample supply of suitable low priced fuel is available) is retrograde. Hubbard[4] states 'It may be suggested that the wages of an operative are not completely covered by the pay packet and that a proportion of his wages may be in the form of improved working conditions.' Mechanical producers offer vastly improved working conditions not only to the producer operators, but also to the retort house as a whole by reason of the relative absence of dust (particularly where automatic chargers are provided and the ash discharge arrangement can be readily mechanised).

Unnecessary Duty

There is also a saving in man-power with a mechanical producer installation. The new Swan Village producer installation is now operated by one producer attendant and one producer ash man per shift. Both these men do a certain amount of cleaning. Recent studies have shown that the producer ash man spends 30% of his time removing ashes and cyclone dust and 9% relieving the producer attendant for meal breaks, etc., and is engaged on cleaning duties for the remainder of his time, while the producer attendant spends 87% of his working time in actual operating duties, *e.g.*, charging, checking and recording firebed conditions, and attending to annular boilers. The time actually spent in manually charging the producer, *i.e.*, emptying the charger hopper by lifting the cone valve counterbalance, and refilling the charger by opening the shutter on the chute from the overhead bunkers is 1¼ hours per shift. This duty would not have been necessary had automatic chargers been provided, and the time saved could have been used for other duties—possibly the disposal of ashes.

When the installation was planned hand charging of producers was specified since it was thought that automatic charging would not save labour and would introduce a further maintenance charge. Experience has shown this idea to be wrong—automatic chargers can be justified on labour saving grounds and more recent installations of mechanical producers in the Birmingham District have automatic charging.

Each bench has its own fire tube waste heat boiler with superheater and economiser. These are operated at 325 to 350 lb. per sq. in. with steam temperature approximately 570°F. Apart from a small quantity of high pressure steam amounting to less than 2% of the total, which is used in an ejector on the deaerator, the whole of the steam produced passes to the back pressure turbo alternator exhausting at 20 lb. per sq. in. for process use on both the new and old works.

The amount of L.P. steam used on the new works is about 60% of the total available. There is no inter-connection of the waste gas flues, so that when a boiler is shut down, the waste gases from the setting pass direct to stack. The advantage of speedier boiler cleaning is shown in the extra steam raised during the year ended March 31, 1957, although this advantage was nullified since, for the last six months of the year, a maximum of three boilers were working at any time as one bench was always down for repair during that period.

Must Be Related

(Tables were included in the paper showing the amount of steam raised and the quantity of electricity generated.) At first sight the figures for waste heat steam raised would appear low but it should be remembered that these are average figures including periods when boilers were perforce shut down. The steam is also measured at approximately 325 lb. per sq. in. and 570°F., and to bring it to the more usual gasworks pressure conditions of 120 lb. per sq. in. saturated, would be increased by 10%. Any consideration of waste heat steam generation must be related to producer fuel consumption and quality. Bearing in mind the consumption of 11.9% fuel containing 26% ash and moisture, the figures are good and compare favourably with the 1,000-1,100 lb. per ton coal carbonised given by Finlayson[3] for waste heat steam from non-recuperative continuous vertical retorts, while the average figure for the four years of 10.65 lb. steam at 325 lb. per sq. in. and 570°F. equivalent to 14.2 lb. steam from and at 212°F. per therm coal gas made is in close agreement with Clark's[2] 13.6 lb. from and at 212°F. per therm gas made.

The relatively low load factor on the alternators, as indicated by the average rate of electricity generated compared with the rated 700 kW, is reflected in the high steam consumption per unit generated at between 38.8 and 54.8 lb. per kW hour. (At full load, the guaranteed steam consumption is 28 lb. per kW hour.) It should be noted that the fuel consumption in the producers is considerably lower than the makers' guaranteed figures so that the steam raised in the waste heat boilers is lower than was originally anticipated—hence, the alternators have never run at their full load.

With the exception of one stand-by boiler feed pump, every drive on the new Swan Village works is electric. The total electricity consumption is in the order of 0.29 kW hour per therm of total gas made. This figure is appreciably higher than that of 0.175 kW hour per therm quoted by Clark[2] for the North Thames Gas Board during the year 1954/55 where, no doubt, there are still a number of steam prime movers. Over 90% of the gas sent out from Swan Village is distributed at medium pressures (up to 90 in. W.G.) through electrically driven turbo boosters. The consumption of electricity by these boosters, which is included in the total used, amounts to about 28% of the total. The electricity generated is over 70% of the total used so that, disregarding the power used for gas boosting, the new works is virtually self supporting in electricity. This means that in the event of a major breakdown in grid electricity supplies, in spite of having all electric drives, the works can carry on full gas production, gas consumers in the immediate vicinity of the works receiving gas under holder pressure, while supplies to more remote consumers would be met by backing up the pressure in the trunk mains from other boosting stations. As a further safeguard the small booster (rated at 900,000 cu.ft. per hour with 42 in. W.G. pressure difference) can be driven direct from the alternator supply, power for this being made available by judicious running of essential plant only, non-essential plant, *e.g.*, coal and coke conveyors, oxide handling plant, coal stacking crane, ventilating fans, lifts, etc., awaiting restoration of the grid supply before restarting.

In a boiler working at 350 lb. per sq. in. the water will be at a temperature of 436°F. and it is clear that the gases must leave the boiler at a temperature in excess of this depending on the efficiency of heat transference in the boiler. Experience at Swan Village has shown this to be in the region of 520°F. In order to conserve the heat in the waste gases leaving the boilers, economisers are provided and these reduce the temperature of the gases to 360-380°F. before discharge to chimney. It will be noted that this temperature is lower than that nor-

mally recommended for outlet waste heat boilers (200°C. or 392°F.).

This temperature is specified as experience shows that at lower temperatures the fan casing, outlet duct and chimney steel work may be rapidly corroded depending on the SO_2 and SO_3 content of the gases. Spiers[5] quotes 40°C. (104°F.) as the dew point of waste gases from the combustion of coke producer gas, which is considerably below the recognised limiting outlet boiler temperature of 200°C. It is true that condensation will take place on any solid surface having a temperature below the dew point of the gases regardless of the gas temperature, and presumably it is to ensure a factor of safety under all conditions that 200°C. has been recognised as desirable at the boiler outlet. This is, after all, a generalisation, and conditions on the actual plant should be taken into consideration when fixing limits. In the case of the new Swan Village waste heat boilers, the whole installation including all ducting and chimneys (with the exception of approximately 5 ft. protruding through the roof) are enclosed in a building and the chimneys are completely brick lined. In these circumstances the temperatures at which the installation is working would seem to be perfectly safe—this is borne out by the fact that after 4½ years no severe corrosion is evident. In this connection it is interesting to note that the actual stack outlet temperature is around 350°F., *i.e.*, only some 20-30° below that at outlet economiser.

By applying the formula, heat recovered in the economiser $= \frac{T_o - T_i}{H - h} \times 100\%$ of total heat recovered,

where T_o = outlet economiser water temperature
T_i = inlet economiser water temperature
H = total heat in superheated steam above 32°F. and at boiler pressure.
h = heat content of water at economiser inlet above 32°F,

it can be shown that the heat extracted in the economisers is equivalent to 10% of the total heat recovered as steam. Since practically the whole of the steam generated is used for electricity production, this means that, owing to the installation of the economisers, 10% additional electricity is generated which would amount to some 335,400 kW hours. Had this not been generated, it would have cost 1.18d. per unit, *i.e.*, a total of £1,650 per annum. In addition to the electricity, there is also 16 mill. lb. of L.P. steam available for process work so that the total annual savings (excluding depreciation and maintenance costs—estimated at £600-£700 per annum) will be in excess of £2,000 per annum.

Opened Up

Three-stage turbo exhausters driven by constant speed squirrel cage pressurised electric motors through scoop controlled fluid couplings to give the requisite speed variation are installed. Prior to the exhauster, the gas has passed through hot gas detarrers operating at 170°F. and then cooled to 60°F. From the early days, trouble had been experienced in restarting an exhauster unless run ' off-load ' at least daily, so that after about 18 months of intermittent running, when No. 2 exhauster showed signs of excessive vibration when running, it was opened up to investigate. Heavy black deposits appeared to be the cause of difficulty in restarting the exhauster when they were allowed to set too hard. A certain amount of corrosion was also evident on the blade tips and rivet heads which hold the blades to the front plates and pitting was also noticeable on the mild steel shaft in the vicinity of the outlet gland. When the same exhauster was opened up some four months later, pitting of the shaft was so bad that it was difficult to get a gas tight seal with the carbon sealing ring which formed the outlet gland. After consultation with the manufacturers, it was decided to have a new impellor with stainless steel front plates, vanes and rivets, and also a stainless steel sleeved shaft to enable extended sealing glands to be fitted. The original rotor which had run for 14,000 hours is now being repaired with similar stainless blades and sleeves, etc., and will be fitted in the other exhauster.

The two exhausters originally installed were each capable of dealing with 415,000 cu.ft. per hour with a pressure difference of 53 in. w.g. This capacity has proved to be satisfactory and consequently was specified when the third exhauster, installation of which was deferred pending actual operating experience, was ordered. In view of the experience with mild steel blades and rotor, stainless steel blades and sleeves were specified for this exhauster.

Cooling water for the primary condensers is pumped from a borehole 450 ft. deep. This water is at a constant temperature of 50°F., but is very hard (60°) and slightly acidic. These factors were allowed for when the plant was designed, and the primary condensers were fitted with galvanised tubes and the top and bottom water chambers were zinc sprayed. To minimise scale formation from temporary hardness, the outlet water temperature on the condensers is regulated to just below 100°F. while calgon threshold treatment is also used, calgon solution being injected immediately at the pump outlet. Slight pitting has recently been observed in the bottom chamber of one condenser, but so far there has been no trouble with the tubes.

Mild steel services carrying the borehole water soon showed signs of corrosion although, in view of the acidic nature of the water, this was to be expected. Plastic piping is now being tried for small diameter services. We hardly expected trouble with cast iron mains, but after two bursts had occurred during the first five years after installation the British Cast Iron Research Association were consulted regarding the cause of the internal corrosion. They suggested that sulphate reducing bacteria were the cause. It should be noted that oxygen is absent in the borehole water at the pump outlet and that, in order to combat the anaerobic bacteria, oxygen is being injected into the water to give a concentration of 2 to 3 p.p.m. A small air compressor is at present on order and will be used in place of the more expensive cylinders of oxygen.

The borehole pumps are of the vertical spindle deep well type and have proved very reliable. One pump has recently been lifted for inspection and overhaul after having run for approximately 1,200 days and was in remarkably good condition, as were the cast iron suction and steel delivery mains (which had been painted internally and externally with bituminous paint before lowering into the borehole).

Owing to the high hardness of the borehole water, town water, of 12 to 13° hardness, is treated in the lime soda softening plant before use as boiler feed. Town water is also used for cooling on the oil coolers of the exhausters and alternators, since the use of borehole water in the small diameter tubes of these coolers would soon lead to trouble due to scale deposition. The cost of softened water varies between about 44d. and 52d. per gal. and the amounts of chemicals used per 1,000 gal. water treated are, lime 2.0 lb., soda ash 1.75 lb., sodium aluminate 0.2 lb.

Although the production costs are low, it is realised that there are possibilities of reducing them further. At the present time a new manning schedule evolved by the Divisional work study department based on method study and the development of an incentive scheme are being tried out.

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[2] L. J. Clark—Steam and Power in the Gas and Coking Industries—*Journal of the Institute of Fuel*, Volume XXIX No. 182. March, 1956.

[3] T. C. Finlayson—Fuel Economy in Coal Carbonisation—*Gas World*. September 6, 1947.

[4] W. S. Hubbard—Recent Producer Gas Practice in the Liverpool Undertaking—Institution of Gas Engineers Communication No. 367 (1950).

[5] H. M. Spiers—Technical Data on Fuel.

DISCUSSION

Mr. D. J. O. Bath (Southampton) President, opening the discussion, said that the paper showed very clearly the flexibility of the works, even during the very difficult period of the Suez crisis. He wondered how far it had been possible to reduce coke stocks as a result of the policy of maximum water gas make and what was the saving in coal at the lower throughputs. Mr. Kilvert, he said, had advocated the installation of mechanical producers. From calculations he had recently seen it appeared that the cost of employing one man on shift work approximated to £1,000 per annum which meant that to

cover a shift job an expenditure of £3,500 per annum was incurred. Had step grates been installed he imagined that the man-power might have been 100% greater and an additional £7,000 per annum would have been expended. He wondered whether Mr. Kilvert had any figures, in addition to those in Table VI of the paper, on the cost of producer gas, particularly to include the capital charges on the plant installation. Mr. Bath commented also on the fact that the works was virtually 'all electric' and wondered how much electrical maintenance cost, and finally enquired if it was known what was the constituent responsible for the corrosion in the exhausters.

Mr. Kilvert, replying, said there was virtually no stocking capacity for coke at Swan Village, and all surplus coke was sent to a central coke stocking area in Birmingham. With regard to the manpower that would have been required had step grate producers been installed, he felt that the figure of 100% increase was low. He regretted he had no figures available relating to capital charges on the mechanical producers. The cost of electrical maintenance on the works had, to date, been very small. There were two electricians employed, but their duties also included new installations.

Mr. D. E. Dobson, Birmingham, agreed with Mr. Kilvert's preference for mechanical producers provided that adequate supplies of No. 4 coke were available. He could not, however, agree that more manpower would be required on the step grate producers. Experience at Nechells works had shown that two men per shift should be able to do whatever fire cleaning was required, provided the step grates were of modern design. He was pleased to see that Mr. Kilvert had stressed the need for speedier boiler cleaning. Mr. Dobson went on to say that he considered the use of a disintegrator for the crushing of spent oxide out of date and preferred a hammer crusher for this job. He then asked Mr. Kilvert what he considered to be the optimum working temperature for tower purifiers.

Mr. Kilvert said that he thought he had made out a good case for mechanical producers and agreed that speedier boiler cleaning was most important since it enabled more steam to be raised which, in turn, meant more electricity generated. He considered that the optimum working temperature for tower purifiers was around 85°F.

Mr. F. Foxton, Cheltenham, said that there was a good deal in the paper on the subject of gas production but nothing about its specific gravity and Wobbe Index, and wondered therefore to what extent this affected the consumer.

Mr. Kilvert regretted that he could give no information on this point but added that since the new works had been in operation for 4½ years, he felt entitled to assume that consumers were satisfied or they would have taken up the matter.

Mr. S. C. Porter, Birmingham, said that the substance causing the corrosion in the exhausters had been identified as ammonium thiocyanate, but it had not yet been determined how this substance was formed. The Wobbe Index of the gas produced at Swan Village conformed to that at the other Birmingham works and fell into group G6. Regarding the treatment of water: Mr. Porter said that with boilers working at 350 lb. per sq. in. it was essential to prevent scale formation in the economisers and detailed the different types of treatments which were applied in addition to the lime-soda softening. These included sodium sulphite to back up the deaerator, sodium sulphate to prevent caustic embrittlement, and phosphate dosing for final conditioning.

Mr. S. K. Hawthorn, Birmingham, said that since having himself given a paper on the layout of the new works it was originally his intention to follow it up with another recording the results; this had now been done by Mr. Kilvert. The aim at Swan Village, he said, was flexibility and the results proved this to have been achieved. Throughputs could be varied to as low as 0.85 tons per 10 in. major axis in summer and to as high as 1.27 tons in winter. The output ranged between 8 and 12 mill. cu.ft. of mixed gas per day. Flexibility in the production of coke had also been achieved. The figures of fuel consumed by mechanical producers were those actually achieved and not estimates, but he considered that mechanical producers were justified only if small grade fuel was available. The fuel used at Swan Village was smaller than it had been thought possible to use and this had been obtained by varying the size of screen meshes to make more No. 4 coke and less breeze. In Birmingham, since all available No. 4 coke was absorbed by existing installations of mechanical producers, the intention was to install roller grates in future reconstructions. These would use run-of-retort coke. He could not agree with Mr. Dobson on the subject of the labour required by step grate producers as compared with mechanical producers. At Swan Village the steam and power position was unique and could not be copied everywhere. The old works provided an outlet for low pressure steam and hence it had been possible to devise a system without using a steam condenser and associated water cooling tower. As the new works had all electric prime movers, no fuel fired boilers had been provided and in recent months the solid fuel boilers on the old works had not been required either. As to the use of a disintegrator for crushing spent oxide, Mr. Hawthorn said there had recently been devised a new type of bottom discharge crusher with twin drums rotating in opposite directions. This, he considered, was an improvement on existing types.

Mr. A. W. Sanders, Leicester, enquired what was the effect of continuous taper retorts. He referred to experiments that had been carried out at Leicester on coke fired producers to enable fine particles to be removed from the producer gas; since it was a Glover West installation at that works the cleaning out of the many nostrils was a daily job. Low grade coal was now being used in their producers since it was considered that this would prove cheaper than run-of-retort coke. He asked if any similar experiments had been carried out at Swan Village. On the question of maintenance costs of producers, he wondered if any more details were available. He was pleased to see that a higher c.v. and thermal output had been achieved at Swan Village than had originally been estimated by Mr. Hawthorn. He also asked what difficulties arose in the event of an electrical breakdown since the works relied entirely on electricity.

Mr. Kilvert, replying to Mr. Sanders, said he thought it significant that during the quarter ended September, 1956, no less than 71 different types of coal with swelling numbers ranging from 2 to 8 had been carbonised without trouble, and he considered that the continuous taper had been of assistance in this. Furthermore, continuous taper retorts, with relatively high steaming enabled coal to be carbonised at high rates. As to coal-fired producers, Mr. Kilvert said that he would not like to try the experiment at Swan Village because of the high cost of coal compared with that of No. 4 coke now in use, and felt that it would be difficult to obtain better results than those achieved at that works. Referring to the maintenance costs of mechanical producers, Mr. Kilvert said that while such maintenance costs were high, he had shown that they could be offset by the the reduction in combustible matter in the ashes as compared with that in those from step grate producers. Last year the maintenance cost was lower than in previous years when the charger cones had burned out by the ash level having been set too high. As to electrical breakdowns, Mr. Kilvert said that this was a question he expected to be asked but could only point out that during the 4½ years the new works had been in operation there had been two complete failures in the electricity supply, but these had been made good within a comparatively short time.

Mr. A. W. Sanders then asked for more details of the variation in the screen meshes Mr. Kilvert had mentioned.

Mr. Kilvert replied that the original ½ in. sq. meshes have been replaced by ¼ in. sq. meshes. A 'floating' mesh, loosely secured at one end by chains rested on top of the fixed mesh, bouncing on it when the screen was in motion. This effectively prevented the screen meshes from blinding.

Mr. S. C. Crathorn, Wolverhampton, referred to Table II of the paper, 'prime cost of manufacture,' and pointed out that there was a marked increase in the item 'coal handling' from 1.9d. per decatherm in 1954 to 3.1d. per decatherm in 1957. Purifying costs had decreased from 1.2d. per decatherm to .7d. during the same period, this, he considered, was due to the work done by the technical staff at Swan Village. In Table III of the paper, the 'cost into holder' difference figure had risen from 8.62d. per decatherm in 1954 to 16.62d. in 1957. Mr. Crathorn then mentioned the use of sand sealed valves on the outlet of the cyclone on each producer and asked if these could be changed. He enquired also how the temperature on top of

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the waste heat boiler stack had been measured. As to the troubles experienced in the corrosion of the exhausters so soon after going to work, he was pleased to hear from Mr. Porter the substance causing the corrosion, and asked if a method of overcoming it had been found.

Mr. Kilvert, replying to Mr. Crathorn, said that the increase in coal handling charges had largely been due to high maintenance costs on the coal crushers, brought about by pieces of tramp iron in the coal received, a matter which had been taken up strongly with the authorities concerned. Further, during the year ended March, 1957, for approximately six months only three benches were gas-making. As to the increase in the 'cost into holder' difference at Swan Village compared with the Divisional costs; this was due to increased throughputs whereas in 1954 the throughput was nominal. The amount of No. 4 coke gasified in the producers had progressively increased until in 1957 it was practically 100%. This had been reflected in lower costs. Regarding sand sealed valves: One of these valves had been removed and an appreciable amount of steelwork had to be removed to change the valve. The top of the waste heat boiler stack was readily accessible as there was permanent access to the roof through which it projected some 5 ft., so it was relatively easy to measure the temperature. Stainless steel was being used in the fabrication of exhauster rotors, but it was not yet known whether this was the complete answer to corrosion and even now exhausters could not be left standing for more than 24 hours otherwise they seized up.

Mr. S. C. Crathorn went on to refer to the mechanical producers and said that Mr. Kilvert had stated that producer gas passed through a cyclone from the generator, the larger dust particles being removed in the process and asked what were the arrangements for flue cleaning.

Mr. Kilvert replied that two men spent about one-third of their time on this work, the dust being mainly deposited in the top flues.

Mr. J. Bates, Redditch, said that it was clear that the good results at Swan Village had been obtained primarily by the use of No. 4 coke, but prices had now risen and he therefore wondered what effect these price increases would have on production costs at Swan Village.

Mr. Kilvert agreed that the low price of producer fuel was the main reason for the low costs achieved, but pointed out that the supply of No. 4 coke was limited in any event.

Mr. W. J. Jewers, Cost Accountant, Birmingham Division, pointed out that apart from washed No. 4 coke, there was little demand for this size in the Birmingham Division, and so any surplus had to be disposed of at a bulk contract price. This contract price was the basis of the charge for No. 4 coke to the mechanical producers. With regard to increase in coke prices in 1954, the price of No. 1 coke was 88s. 6d. per ton while it was now 130s., an increase of almost 50%. The corresponding figures for bulk contract No. 4 coke were 48s. to 50s. per ton in 1954 and 55s. today—an increase of only 10% to 15%.

Mr. S. C. Porter said that it was not often that one had the opportunity of reporting on new work as Mr. Kilvert had done so well. The flexibility of the new Swan Village works had been admirably stressed and the unusual features had been shown to be dependent largely upon the proximity of the old Swan Village works. Referring to the optimum temperature for tower purifiers, Mr. Porter said that it was often misleading to insert a thermometer in the gas main since the thermometer measured only the temperature at that particular point. He felt that the temperature taken between the trays in the towers would be much more revealing. Experience at Nechells had shown that the temperature of the outlet gas was not as useful as one would like it to be. He proposed a vote of thanks to Mr. Kilvert, which was passed with acclamation.

Marking Containers of Hazardous Chemicals

A SECOND edition of 'Marking Containers' has just been published. It will be recalled that the marking containers scheme is intended as a safeguard to all concerned in this country with the handling, transport, and storage of hazardous chemicals up to, and including, the time a container is opened for use on the premises of the consumer. The labels recommended in it contain a signal word, a statement of the main hazards, and precautions to be taken, as well as advice on action in case of accident using a standardised format and phraseology. The Council of the Association has recommended the manual as a code of practice. The first edition was published in 1953 and the second edition has been completely revised and brought up to date. The list of chemicals for which warning labels are recommended has been considerably extended and now contains 331 different products.

Some alterations to the text have also been made. Among the more important changes are that only one label size is now recommended whereas previously there were two, and that chemicals which must by law be labelled 'poison' under all circumstances, and whose *only* hazard is toxicity by ingestion, have been omitted from the list of recommended labels because the statutory wording is considered to give sufficient warning. A list is also given of substances which have been considered for inclusion and rejected for various reasons. A number of minor changes have been made for the sake of consistency but it has not been necessary to alter the basic principles.

The scheme has been well accepted and has now been adopted by almost every member of A.B.C.M., who manufactures hazardous chemicals. Many of them have incorporated an A.B.C.M. label into a composite label with others. Some members of the Association require their suppliers to label their products with an A.B.C.M. label, while others affix an A.B.C.M. label to containers received in their works. The Manufacturing Chemists Association of America has a similar scheme in the United States and close contact is maintained with a view to bringing the two schemes into as close agreement as possible having regard to the different conditions and legislation in the two countries. An encouraging interest has been shown in the A.B.C.M. scheme by other industries, by transport organisations, by the Factory Department and by the International Labour Office which is preparing an international manual of guidance for labelling schemes based on the A.B.C.M. and M.C.A. schemes. Copies of the new edition may be obtained from the Association of British Chemical Manufacturers, 86, Strand, London, W.C.2, price 10s.

British Rubber Directory

THE 1958 edition of the 'Directory of British Rubber Manufacturers and Products,' just published, provides a complete buyer's guide to the British rubber industry in English, French, German, and Spanish. Over 600 products are listed under headings which cover belting, hose, engineering components, domestic, sports and surgical goods, adhesives, insulating materials for heat and sound, proofed fabrics, floor coverings, soles, heels, footwear, plastic and latex foam. There is also a complete section devoted to tyre manufacturers.

The directory is primarily designed for overseas circulation. Of an initial printing order of 4,000, about 3,500 will be sent abroad, and copies will be distributed to every country in the world. It is published by the Federation of British Rubber and Allied Manufacturers, and is free to overseas importers of rubber products. A limited number will be available to other readers on application to the Federation offices, 43, Bedford Square, London, W.C.1, at 25s. per copy (postage and packing 3s.).

Architecture and Planning

THE 'Official Architecture and Planning Year Book, 1958,' price 15s., just published, is a concise and up-to-date reference book for architects, planning officers, consultants, contractors, suppliers, and all connected in any way with architecture and planning. It is the only reference book giving a detailed list of names of the architectural and planning staffs of local authorities, government departments, statutory authorities, and particulars of institutions, associations and other organisations directly or indirectly concerned with architecture, planning, and building.

From a paper to the Midland Junior Gas Association.

Some Notes on Gas Governors

By H. E. SHAW

and

M. W. JEAVONS,

JEAVONS ENGINEERING CO., TIPTON, STAFFS.

THE object of this short paper is to try to present some of the factors in design and manufacture of gas governors from the small units as fitted to appliances, to large district governors, both high and low pressure.

Prior to the last war, governors were considered by some engineers a luxury to be avoided wherever possible.

They were of course fitted to some appliances, notably cookers, fires and water heaters, but the total percentage of governed domestic appliances was not large. There were also a number of high pressure distribution schemes necessitating service and district governors, but these were not a common feature of the pre-war British gas industry. The development of the Yorkshire Grid was a completely new innovation in this country at that time. Volumetric governors by other manufacturers were installed to feed the various holder stations from the high pressure network, and holder valves were also fitted to shut off automatically the gas supply when the holder was full.

Recently the growth of demand for gas governors of all types has been very considerable. In fact they have become an essential part of gas industry policy for station, district, service or appliances requirements. While it is the intention that this paper should touch on most makes of governors at present in vogue, you will, we feel sure, understand if many of our comments are based on the experience of our own company over the past quarter of a century. We have tried to be strictly impartial in our views and we trust that you will consider this to be a fair appraisal of the position as regards governors for the gas industry both in the past and at the present time.

Our company first came to be connected with the manufacture of gas governors in the early 1930s. The parent company had of course been actively engaged as mainlaying contractors to the gas industry for the previous ten years. Naturally enough, their mainlaying activities resulted in numerous requests for governors, mainly of the high pressure service and district types as they were specialising in high pressure transmission at that time. In about 1930, the founder and present chairman of our company acquired by purchase a firm known as Gas Distribution Ltd., whose many connections included valuable contacts with a large manufacturer of gas regulators and ancillary equipment in the United States of America. At that time it was the policy of our company to import H.P. service and district governors from the U.S.A. and many of these governors are still functioning with entire satisfaction.

Vast Experience

At this point we should like to pay tribute to the American designers of high pressure service and district governors whose ideas were so sound in principle, based on their vast experience of high pressure transmission, that comparatively little modification has had to be made over the years. Of course the original American governors had to be 'Anglicised' in the first instance, but they soon became 'naturalised' and 'pressurised Britishers.' The same position doubtless applied to some other makes of governors in this country at the same period. After a time, however, it became apparent that import of American governors was no longer a practical proposition largely owing to the restrictive *ad valorem* duty imposed by the Customs Authorities. We therefore decided to undertake in this country the entire manufacture of governors with all possible speed, and high pressure service governors were first on the list. Several types were made available and were adopted by a large gas undertaking; many thousands were supplied which have been and still are in continuous use. Although improvements have been made with these mercury sealed governors from time to time, the basic design has been virtually unaltered over the years. Preparations were also being made at the same time for production of high pressure district governors, to which we shall refer in greater detail later in this paper.

Since there seemed insufficient demand for high pressure governors at that period to maintain large scale production, after careful market research, it was decided to launch out into the low pressure service and appliance governor sphere, and within a short period, governors for domestic, commercial and industrial appliances, etc., were being produced in fair quantities.

During the late war, our firm was busily engaged in the manufacture of governors for sub-normal outlet pressures as low as 0.5 in. W.G. These were particularly in demand following 'blitz' conditions in any particular locality. The idea in some quarters to ensure the continuity of vitally important manufacture of munitions was to classify industrial furnaces, salt baths, etc., as number 1A priority and to grade the other gas appliances according to their degree of importance in any particular works. This meant that in the event of very low district pressures caused by an emergency, the super priority appliances governed to, say, 0.5 in. W.G. outlet pressure were kept in operation while other less important units were rendered inoperative until conditions had reverted to normal.

Inlet Pressure Fluctuation

It was not an easy matter to provide a minimum outlet pressure of 0.5 in. W.G., and in actual practice this was in the region of 1 in. W.G. as the burners would not operate satisfactorily below this pressure.

Appliance governors of single diaphragm and metal valve construction continue to be made in large quantities for cookers, fires, space heaters and other purposes. Similar units especially designed for extreme sensitivity at gas rates as low as .4 cu.ft. per hour, are also in common use in refrigerators. Single diaphragm governors are particularly suited to variable gas rates such as encountered with cookers, but outlet pressure readings are somewhat susceptible to inlet pressure fluctuations owing to the fact that the governors are not compensated. Until three or four years ago, these appliance governors were almost entirely weight loaded, but the modern tendency appears to be towards spring loading, with of course the exception of cooker governors where accuracy demands weight loading. The main reasons for spring loading are:—

(*a*) The ready adjustment of outlet pressures to cater for varying calorific values of gas throughout the country, and

(*b*) many small governors are now fitted in a vertical plane which precludes the use of loading weights.

Wherever conditions permit with these particular governors, weight loading is clearly preferable to spring loading insofar as accuracy of controlled pressure is concerned. A recent development is the introduction of the compensated small low pressure appliance governor, mainly up to ½ in. or ¾ in. size, in which a balanced valve effect has been produced within compact dimensions. These can be accommodated in the particular appliances which are designed to take governors

of smallest possible overall size consistent with adequate capacity rating. They are not affected by inlet pressure fluctuations, within their range, but are only intended for more or less fixed gas rate conditions as applicable to water heaters and space heaters, etc.

We turn now to the medium and larger size appliance governors of double diaphragm and leather valve construction. The original types were of cast iron and aluminium construction and the respective diaphragm areas were of ample proportions to provide extreme sensitivity. In some instances, however, the large diaphragm cases were an encumbrance particularly in confined spaces, and the cost of the smaller sizes was relatively high.

It was therefore decided to introduce alternative types which would provide low pressure double diaphragm compensating governors not only for industrial and commercial appliances, but also for service requirements. The design was revolutionary inasmuch that Mazak zinc alloy diecastings were introduced for the first time as gas carrying components in this country. While the initial outlay for dies was heavy, the production costs were reduced to a fraction of those of the traditional types, without appreciably affecting performance characteristics.

When the Government launched the prefabricated house programme immediately after the war, the authorities decided to specify a meter governor to each house supplied by gas, and our company among others was privileged to supply a considerable number of angle type governors which were fitted to the meter inlet. Had it not been for the zinc alloy diecasting at the time, we should have been unable to meet our commitments which were very heavy for a fairly prolonged period. After consultation with the Authorities, however, it was decided to entirely dispense with manufacture of zinc alloy governors in favour of aluminium alloy. After considerable expenditure on new dies and in one or two instances the modification of existing casting moulds, the difficulties in machining of aluminium in the early stages were overcome and techniques were adopted to cope with the silicon aluminium alloy. This was chosen for good tensile strength and elongation consistent with reasonable casting properties. Several months later the price of zinc rocketed whereas that of aluminium remained stable, with a considerable saving in cost to the gas industry. There was also the great advantage of much lighter but equally strong construction with aluminium, the weight of which was approximately one third that of zinc alloy. Governors which had previously been made of brass were also converted to aluminium with consequent reduction in cost. Small aluminium appliance governors were originally fitted with screw-on tops, but this was too lengthy a machining process, so that bolt-on tops were introduced with appreciable saving in machining and assembly time.

Demand Has Risen

The advantage of these governors, particularly in certain parts of a distribution system, according to pressure conditions, was quickly realised by many gas engineers throughout the country, and the use of low pressure service governors soon became more popular, largely due to changes in distribution practice by some undertakings. At one time it seemed as if the appropriate gas authorities might recommend the general use of service governors instead of appliance governors, but this did not happen.

Since the war however, the demand for service governors has steadily risen. In some Boards the distribution policy is to increase pressures in existing mains and to fit service governors throughout whole areas, rather than lay new mains —a decided advantage in some circumstances. District pressures are normally stepped up to say 20 in. or 24 in. W.G. but in some instances even to 40 in. W.G. and the service governors reinforced accordingly.

Without wishing to be controversial, we would add, that in our view, providing the carcassing of the building is adequate and assuming that minimum district pressures are reasonable, the domestic service governor may perhaps be considered preferable to the appliance governor, particularly where more than one gas burning unit is in question. There is also an added advantage that the service governor will operate at a maximum inlet pressure of more than double that of the appliance unit. On the other hand, where carcassing is limited in size such as encountered in some of the older dwellings, then the appliance governor comes into its own. Service governors (angle type) are mainly fitted at inlet to the meter, thus protecting it against excess pressure and providing greater accuracy of metering than would otherwise be the case. A fair number of the governors for 'prefabs' were specially tapped on the outlet side for a connection to be taken to the gas refrigerator, since its consumption was too small to be recorded. Horizontal type service governors were also fitted at meter outlet in certain instances. Experiments have been carried out from time to time with venturi-outlet units, with a view to providing a boost in controlled pressure at periods of peak demand. Such tests however, have proved unsuccessful, largely owing to instability of performance.

Merits and Demerits

Basically there are six different types of lever operated high pressure service governors, namely:—

(1) Mercury seal pattern (integral or detachable seal).
(2) Mechanical seal type (internal or external seal).
(3) Single valve construction.
(4) Twin valve, ditto.
(5) Vertical pattern with mercury or mechanical seal.
(6) Horizontal or vertical ditto.

Needless to say, the alternatives obtainable from various combinations of the above mentioned are numerous. The merits or demerits of the various types are summarised as follows:—

Item 1.—As far as our own manufacturers have been concerned, the fully high pressure governors, to suit minimum inlet pressures of 1 lb. per sq. in. have always been of the integral seal type, and this also largely applies to other makes, in this country. For what might be termed intermediate pressures, however, say 6 in. W.G. to 10 lb. per sq. in., until recently it was not uncommon for similar types of governors to be supplied without mercury seal but with provision for fitting the latter, if desired, at a later date. With the modern accent on safety, most of the existing governors of this type without seals, have been duly fitted over a period of time. Similarly a fair number of twin diaphragm direct-pull service governors which had been working under pressures up to perhaps 30 in. W.G. or higher, were duly replaced by the lever operated mercury sealed type which we consider essential if the maximum degree of safety is to be provided. For in the direct-pull governors the secondary diaphragm is subjected to the full inlet pressure, whereas the diaphragm of the lever operated unit is never called upon to withstand more than 12 in. W.G., at which pressure the seal is usually set to blow. The main advantages of the mercury seal are that they are positive in action and easy to maintain.

Item 2.—This type of governor is similar in operation to Item 1, but the mechanical seal dispenses with the use of mercury and may be in the form of an external device or more commonly a diaphragm actuated internal relief valve. Spring loading is also substituted for weight loading for the sake of convenience, since extreme accuracy of the controlled pressure is not essential with this type of governor. The internal relief valve is pre-set to open at a constant differential pressure of say 6 in. W.G. above the governor outlet setting, which is adjustable by means of the spring loading. To these advantages may be added the saving in cost of mercury, but, though this type of seal is tamper-proof, it is perhaps not quite so easy to maintain on account of the necessity to strip down the governor completely for this purpose.

Item 3.—Although single valve construction has its limitations, notably its throughput at very low inlet pressures, its advantages greatly outweigh the disadvantages. Maintenance of the single valve unit is comparatively easy, and our own governors have always been designed to facilitate speedy replacement of valve pads when occasion demands.

Item 4.—The twin valve unit is eminently suitable under minimum intermediate pressure conditions, but cost is relatively high and maintenance somewhat involved owing to the necessity to synchronise the valves, after replacement of pads.

Item 5.—This pattern has fixed vertical connections for upward flow only and has the advantage that the high pressure supply is reduced at the steel inlet nozzle, *i.e.*, the body casting is consequently only subjected to say 12 in. W.G. maximum

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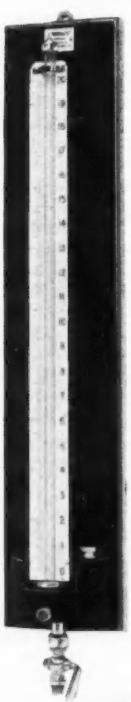

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pressure at any time. Inspection doors are provided so that the valve unit may be easily detached and if necessary replaced with the governor *in situ* and without removing any other part.

Item 6.—With this type of governor, the spring loaded diaphragm case assembly is usually attached to the connection chamber by means of a swivel union. This facilitates both installation and maintenance, inasmuch that the detachable diaphragm case assembly can be turned through 360° in relation to the supply pipe. The design of this governor, however, necessitates the use of sliding parts, thus causing slightly more mechanical friction than is experienced with the simple vertical type (item 5).

The various types of district governors (low pressure) may be classified as follows:—

(*a*) Twin diaphragm, single valve, direct-pull construction.

(*b*) Single diaphragm, twin valve, ditto.

(*c*) Twin diaphragm, twin valve, ditto.

Item a. This type of governor is compensated against inlet pressure fluctuations by the effective areas of the secondary diaphragm and valve being equal and thus balancing each other. Its single valve construction greatly facilitates maintenance, particularly in confined spaces, as the valve gear is easily removed and replaced. This type of unit was primarily designed for low pressure operation, and although it can be reinforced if necessary for inlet pressures up to 5 lb. per sq. in., it is not recommended for district work at pressures exceeding say 40 in. W.G. This is because the governor is dependent upon its secondary diaphragm to isolate the inlet pressure from the downstream side, and there is a limit to what it will withstand, at least for continuous periods.

Item b. With this particular governor, the double beat valves balance each other, but unlike (*a*), the standard units will operate satisfactorily at inlet pressures up to 10 lb. per sq. in. Generally speaking however, maintenance is complicated and often takes much longer owing to the necessity to synchronise the valves before putting the governor back into operation. This is often a difficult matter when such equipment is installed in pits. Some makes, however, allow for removal of the valve unit and other internal parts through the top of the governor which is sometimes an advantage where there is a shallow cover or where a deep pit is not practical.

Item c. This works on the same principle as (*b*), namely with twin balanced valves, but the additional secondary diaphragm is mainly used as an isolating medium for various forms of pressure loading, etc. Items (*a*) and (*c*) may be adapted to various forms of pressure loading, with or without clocks, for one or more outlet pressure settings. In such cases, it is usual to counter balance the valve mechanism of the main governor by unloading it to minus 1 in. or 2 in. W.G. in order to establish a flow through the pilot system from the upstream to the downstream side.

Proved its Worth

Intermediate and high pressure district governors may be considered in the following categories:—

(*d*) Double valve, direct-pull governors (for intermediate pressures only).

(*e*) Double valve, lever operated governor with external lever and auxiliary bowl.

(*f*) As (*e*) but with internal lever and isolating diaphragm.

(*g*) As (*e*) and (*f*), but with detachable valve box assembly.

Having already described double valve direct-pull governors under (*b*) and (*c*), the double valve lever operated governor with external lever and auxiliary bowl is too well known to warrant much comment except to say that it has proved its worth over a long period of time.

Item f. The internal lever type governor has certain advantages, despite the fact that overall length or height is likely to be greater than that of the external lever pattern. The salient feature of the enclosed lever type governor, however, is that its balance cannot be inadvertently upset by 'some person or persons unknown.' Another important point is that it can be installed as an ordinary governor, *i.e.*, without relay system if low 'lock-up' is not of paramount importance in

the first instance. Pilot control can then be added at a later date, if required, for 'bottle-tight' no-load conditions, with only minor alterations to the main governor in the line. Inspirators are sometimes fitted to these pilot systems where periodically low inlet pressures are encountered.

Item g.

(1) Maintenance of district governors largely consists of periodic attention to valve boxes. With this type of governor the valve bowl assembly can be removed, renovated and replaced in position, without interfering in any way with the other parts of the governor. Moreover, valve bowls are interchangeable, size for size, with any governor of the same make. It will therefore be seen, that one spare valve box assembly will serve any number of governors of appropriate size and type. This means that valve assembly units taken from 'active service' can receive attention, including synchronisation of valves, on a workshop bench, instead of *in situ*, where elbow room is often necessarily restricted.

(2) The readily interchangeable valve bowl facilitates simple conversion of the governor to differential control whereby the valves are required to fall to the closed position when the unit is going out of action. For this purpose, the valves are reversed in their housing and slight modification made to the top and bottom diaphragm cases of the main governor in which a stop is also provided for the valves in the open position.

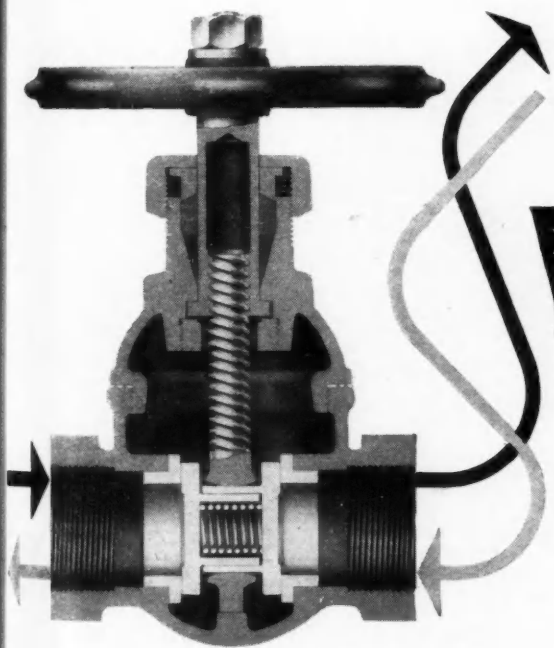
(3) Other adaptations of this pressure governor can be easily made, namely, pressure relief valves, volumetric governors, inlet-pressure controlling governors and holder control valves, etc., of every type and description.

Features of Modification

The basic pressure governor described in item '*g*' is readily adaptable as a volumetric, inlet pressure or holder control governor, or alternatively a combination of the three, with holder controls either gas pressure or electrically operated. The main features of modification are (*a*) reversed valves to fall shut, (*b*) full bore pilot connections to top and bottom diaphragm cases. Special features can be arranged to suit the conditions appertaining to the particular grid or network in question and the equipment can be supplied for manual or remote operation. An item which we consider may be of particular interest is our patent two-way volumetric governor, which single unit, will feed gas volumetrically in one or other direction according to choice, *e.g.*, from Tipton to Bilston or Bilston to Tipton. One set of pilot gear serves the main two-way governor and special change-over mechanism is provided to reverse the direction of flow at the appropriate time. The main unit is fitted with a gland and experiments are being made to provide gland packing which is impervious to the properties of the gas.

The double diaphragm single valve type governors already described are usually supplied for industrial purposes with provision for adjustable outlet pressures, mainly by weight loading with perhaps the exception of governors for some types of industrial space heaters, etc., when spring loading is called for. Zero outlet governors are also in large demand for use with forced draught industrial equipment, and such governors are normally adjustable between say plus or minus 2 in. W.G. from a maximum inlet pressure of 8 in. W.G., with one stage reduction. This type of twin diaphragm single valve governor is also adaptable for use as a fan failure valve, to automatically cut off the gas to an appliance in the event of interruption of air supply from fan or blower. One interesting feature is a patent combined no pressure gas cut-off and fan failure valve which automatically shuts off the gas to the appliance (*a*) when inlet gas pressures fall below a predetermined limit and (*b*) upon interruption or failure of air supply from fan.

This equipment consists of one main cut-off device only, with pilot valve and manual re-set button. There is also an increasing call for press button weep re-set cut-off valves of various sizes for industrial use and a full range of patterns are available which are approved by H.M. Inspector of Factories and other leading Authorities.



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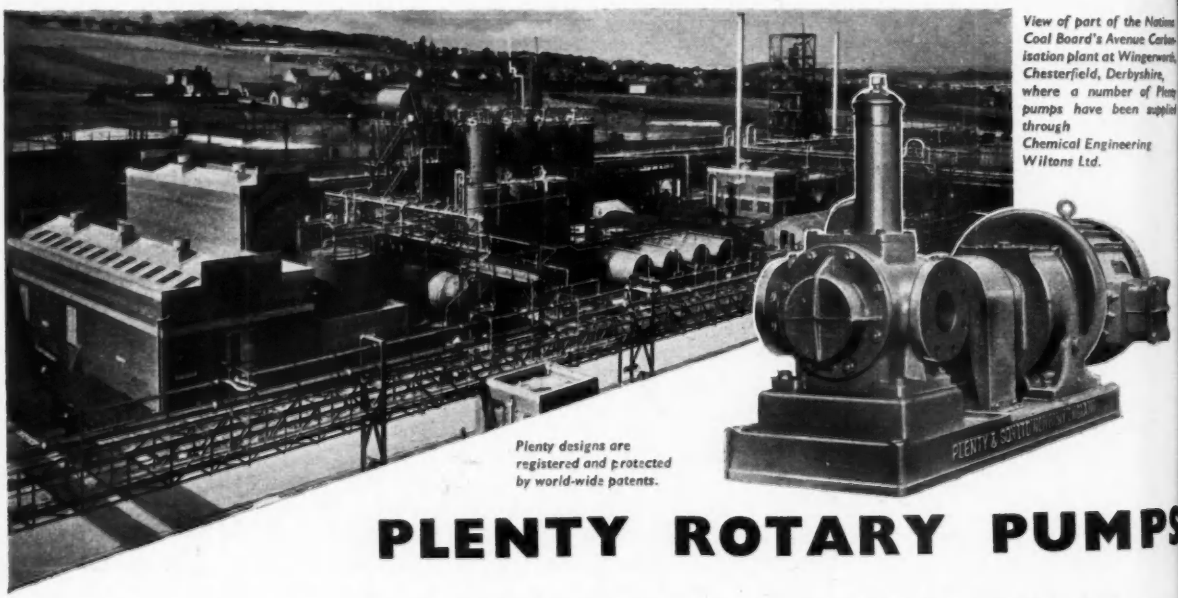

View of part of the National Coal Board's Avenue Carbonisation plant at Wingerworth, Chesterfield, Derbyshire, where a number of Plenty pumps have been supplied through Chemical Engineering Wiltons Ltd.

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